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VOL. XV NO. 4

UNITED STATES NAVAL MEDICAL BULLETIN

PUBLISHED FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

ISSUED BY
THE BUREAU OF MEDICINE AND SURGERY
NAVY DEPARTMENT
DIVISION OF INSTRUCTION AND PUBLICATIONS
CAPTAIN F. L. PLEADWELL, MEDICAL CORPS, U. S. NAVY
IN CHARGE

EDITED BY
LIEUTENANT COMMANDER W. M. KERR, MEDICAL CORPS, U. S. NAVY

OCTOBER, 1921
(QUARTERLY)

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NAVY DEPARTMENT,
Washington, March 20, 1907.

This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

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PREFACE.

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, abstracts of current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will recommend that a letter of commendation be forwarded to him upon the acceptance of his manuscript for publication, and that a copy of this letter be attached to his official record.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General United States Navy.

NOTICE TO SERVICE CONTRIBUTORS.

When contributions are typewritten, *double spacing* and wide margins are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form such as letterheads, numbered paragraphs, and needless spacing between paragraphs, all of which require correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues. This is not only important in special articles, but still more so in reviews.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscripts and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

Only the names of actual reviewers for a current number appear.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc. All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.*

U. S. NAVAL MEDICAL BULLETIN

VOL. XV. OCTOBER, 1921. No. 4.

SPECIAL ARTICLES.

REMARKS ON COLOR BLINDNESS, TOGETHER WITH SOME OF THE OBJECTIONS FOUND WITH A FEW OF THE COLOR PERCEPTION TESTS NOW IN USE.

By E. J. GROW, Captain, Medical Corps, United States Navy.

Contrary to the generally accepted idea, color blindness is found both as an acquired and congenital affection. The former accompanies certain diseases of the retina and optic nerve, and is much more frequent than is supposed; the latter is not exactly a disease, but a condition depending upon causes that have thus far baffled science to discover.

Congenital color blindness may present a total inability to distinguish any color whatever, a condition very rarely found, or it may show a defect in color perception so slight as to be discovered only with difficulty, this latter being very common. Between these two extremes an infinite number of degrees of partial color blindness are found; in fact, it is difficult to find two color-blind persons with exactly the same amount and degree of color defect. It is also rather unusual to find a person who is completely color blind to one color without at the same time being more or less deficient in the perception of at least one other color.

It is generally supposed that in total color blindness all colors have a gray appearance and that the loss of perception for any one color results in a gray hue for that color. This may be true provided no other wave lengths are reflected from or transmitted through the color object observed, but as this is generally the case, no one knows with certainty exactly how colors are perceived by the color blind. A person who is red blind sees a dark-red object as nearly black while a light well-saturated red excites in him a visual sensation not unlike that received from a light green. In this way a red-blind individual is often confusing certain shades of red and green but not all shades. The shade of green which is most often confused with red by red-blind people is a blue green, the complementary color of red, and not a pure arsenite of copper green. In connection with this fact, it will be remembered that the green running lights on most of our boats in the Navy have a distinct bluish cast. The above

would make it appear that blue would not be a useful color adjunct in the glass used for running lights as it would tend to increase the chance of confusion, but this confusion is not so readily found in transmitted light as in reflected light.

Partially color-blind people have the sense of detecting differences in luminosity highly trained. This assists materially in avoiding color mistakes. Take a red-blind individual and place before him a bright red and a bright green object of such shades that they appear to him to be the same as far as color is concerned, and in addition arrange it so that the luminosity of each object appears the same to the normal eye, then in spité of this similarity he will, after a little practice, instantly tell which is red and which is green by the difference in luminosity alone, because the relative luminosity of objects as seen by the color blind is so different from that seen by the normal individual. In this case the red object excites very little retinal stimulation in the red blind and looks very dark, perhaps nearly black or of a very dark brownish shade, while the green object excites full retinal value and is seen in its full luminosity, and the difference in luminosities is therefore marked even though it appears practically the same to the normal eye. This rather curious fact is often overlooked in tests for color blindness and explains how some partially or completely color-blind individuals have comparatively little difficulty in distinguishing certain shades of red from green if the luminosity of both test objects is high, but reduce the luminosity especially that of the green object to a point so low that it looks like a red object to the color blind, and then he is robbed of the aid that luminosity gives and is compelled to rely on color sense alone, with the result that a confusion of colors is experienced and the color defect is demonstrated.

What is true in regard to those affected with red blindness is also true in a little less degree of the green blind so that in any test for detecting color blindness measures should be devised that will take away, as far as possible, the color blind's greatest aid, luminosity. This fact was taken into consideration in designing an improved color test, a description of which will appear in a future article.

As to acquired color blindness, it is always met with in cases of optic atrophy. In fact, this disease furnishes one of the most frequent causes of disturbed color perception. Here we may expect a loss of visual acuity along with a gradual lessening of the color vision. In this class of cases the loss of the central perception for green is first noticed, followed closely by that for red, and by the time these are gone the loss of perception for yellow and finally for blue is experienced. In some cases of poisoning by chemicals, also not infrequently with persons who use alcohol and tobacco with

excess, we find a small central scotoma for colors. If from these latter causes, the loss of color perception is often restored provided the case is properly treated. Almost invariably in acquired color blindness the form vision is also faulty, which gives us a possible aid in diagnosing the acquired from the congenital type. Occasionally a marked diminution of color perception is experienced for several months, only to clear up finally and leave no traces behind, all apparently without cause. This is an exception, however. As to the pathology of such cases, it is difficult to say. The writer well remembers the case of a young naval officer who noticed that he could not see the red and green lights at night nearly as far away as he was accustomed, but if he came close to the colored lights he could see them perfectly as far as he could judge. There seemed to be nothing to account for this condition and the form vision was not interfered with. After this had lasted for six months he found that he could see colored lights farther and farther away and finally the normal condition was fully restored. This officer had been subjected to the bright sunlight on the water for some weeks prior to this curious phenomenon and this may, in some way not fully understood, have caused the color defect. All this goes to show that acquired color blindness must always be kept in mind when patients are affected with a lack of color perception in any degree whatever.

To demonstrate with accuracy the existence of a color defect in some individuals requires careful and painstaking effort. Not only must the tests employed be such as to assure confidence in the results, but the examiner must be well trained in this line of work to enable him to exercise sound judgment in interpreting the results obtained from the various tests employed.

Color blindness causes no great hardship on any person unless he wishes to take up some calling in which accurate determination of colors is a requisite, such as an employee on a railroad or on a seagoing vessel. Here it must be borne in mind that one must be on the alert for all sorts of tricks and schemes to deceive the examiner, especially by those who know in advance that they have a color defect which might be sufficient to deprive them of obtaining a lifelong occupation. This is noticeably true of applicants for the Naval Service. One of the most frequent methods of surreptitiously passing the color examination is to obtain the test used in advance, then to practice with it until, by the aid of relative luminosities and in other ways, the applicant often is able to slip by a somewhat inattentive examiner. That a color-blind person may enhance his chance of eluding the examiner in this way is true beyond any argument, and it is remarkable what improvement may be obtained by only a brief acquaintance with most of the tests in general use. In devising the improved color test mentioned above this fact has been con-

sidered and a scheme worked out by which the applicant under examination can gain a minimum of advantage even though he has possession of the test and should practice with it long and continuously prior to examination.

The custom of requiring the applicant to name the colors in whatever test he is being examined has evoked a great deal of discussion pro and con. After weighing the arguments presented by both sides the consensus of opinion is that not only is it not necessary to give color names, but it is inadvisable, as the color blind have ways of giving the names correctly though they may not see the color as a normal eye should. An uneducated person will often have either no correct knowledge of the names of the colors, or he will, in his enthusiasm, give more or less fanciful color names that will leave the examiner in the dark as to whether the colors are really seen in their true value or not. The ideal arrangement would be to have a test so simple that it would permit of the application of a rule that the less talking there is on both sides during the examination the more accurate will be the results.

The tests used for detecting color blindness are many. All are probably of use, but some are of decidedly more value than others. No test has ever been devised which satisfies all the objections that can be raised against it. The efficiency of any one test depends in a great measure upon the skill, judgment, and common sense of the examiner.

Two tests much used and well thought of on the Continent, but seldom seen in this country, are the pseudo isochromatic diagrams of Stilling and the cards of Nagel. The former consists of squares of selected colors, so arranged that they form different letters or figures, and the colors are chosen with reference to confusions which are well known to bother ordinary color-blind persons. To this class the squares all look alike, and they are unable to see the letters which are formed by them, thereby demonstrating the lack of color perception. This test would be of far more value if all color-blind individuals presented the same degree of defect, but as this varies greatly this test fails to detect many. The latter test consists of 12 cards on which are presented a number of colored disks arranged in circles. The disks on some cards are all of the same color, but of slightly different shades, while on other cards the usual confusion colors are presented. By requiring the person being examined to select all the disks of the same color, the absence or presence of color blindness is determined. This test is a delicate one and requires not only keen color perception but an active mentality as well in order to give anything like satisfactory results. Both of these tests have many objections, by no means the least of which is that an intelligent color-blind individual can gain a tremendous advantage if he has the

privilege of studying and practicing with them before examination. How advocates of these tests can gain anything like satisfactory results when under the stress of examining a large number of men in a limited time, as is often required, is a mystery. Certainly, for our use in the United States Navy, they would be only of problematical value as a confirmatory test in a few doubtful cases, and only then when the time and patience of the examiner could be utilized ad libitum.

Most of the color tests in general use are mainly qualitative in nature, though a certain amount of quantitative information can be deducted from some of them. A few tests, as that of Wolffberg and Weber, are wholly quantitative. They are based on the principle that a colored object of a definite area can be seen at a certain maximum distance. If the object is of such size that its color can normally be correctly made out at 20 feet and no further, by a person with average color perception, a 20/20 color vision basis is established; the denominator of the fraction indicating the maximum distance at which the color is to be seen normally and the numerator the distance at which it is actually seen. Thus, if the applicant can not state the color correctly unless he walks up to within 3 feet of the test object, he would be recorded as having 3/20 perception for that particular color; a scheme of examination not unlike the one now used in the United States Navy to determine quantitatively the form vision. From a practical standpoint the above-mentioned tests are more or less unreliable, as slightly varying conditions of the illumination, together with the frequent differences in brilliancy of the test color, tremendously alter the results of the examination. Even if the examiner had his own test completely standardized under operating conditions, the knowledge thereby gained would be of little value because what we wish to know, in the military service, is not so much the accurate determination of the quantitative color perception in any case as we do the qualitative perception. Has the applicant under examination normal color vision or not? This is the question we ask ourselves. If not, he would be a menace if placed in responsible positions on shipboard where judgment and action depended in any way upon the correct interpretation of either colored lights at night or colored flags in the day time; in other words, he should be rejected for such occupation if his color vision is below normal.

This brings up the question, What is normal color vision? Both scientific experiment and practical experience teaches us that the realm of normal color vision covers considerable latitude. The minimum might be represented by a person who perhaps has never been taught the names of colors nor has had occasion in his daily work to observe colors or give such matters any thought, but when placed before reliable tests gives evidence of seeing the primary colors suffi-

ciently accurately to safely warrant his employment in responsible positions where correct determination of colors is necessary. The other extreme of normal vision might well be represented by the person who can actually see violet as a distinct color in the spectrum. It is claimed that not one person in five thousand has sufficiently acute color perception to enable them to do this. Between these two extremes lie many different degrees of proficiency, all of which could properly be considered as coming within the realm of normal color perception. Women in general appear to average higher than men in this matter. Whether their better color perception is because women as a rule use colored materials more than men, or whether it is due to some hereditary influence, science has not enlightened us, but the fact remains. Artists who have used colors for a considerable time become highly proficient and can see shades and tints that are denied to many not so trained. That the delicacy of color perception can be improved by study and practice is true, as the writer well knows, for he can now see red in certain dark purple pigments which formerly were considered as simply blue or indigo.

In testing applicants for the United States Naval Service for color blindness we are not so much concerned with the upper as we are with the lower register of normal color perception. In order to satisfy this requirement we should introduce a quantitative element which might be considered the only quantitative determination necessary in our tests, namely, the establishment of a point or threshold below which it is not safe to accept men for the service. There is no dividing line to mark the transition from normal to defective color sense. All tests leave a wide margin in this respect, and a wider margin is left to the whims and fancies of the various examiners who arbitrarily settle this point as their conscience seems to dictate at the moment. How often have we seen a candidate rejected by one examiner only to be accepted by another and both examiners using similar tests. How often have we seen several examiners constituting a board acting as a sort of a court of appeal, repeatedly examining candidates and finally being considerably in doubt as to whether they were color blind or not. This is explained by the fact that such candidates represent border line cases in the transition from the normal to the abnormal in color perception, and when our tests are most needed to decide these cases they fail and leave us stranded, the decision reverting to the examiner who is as likely to be wrong as right. As far as color perception is concerned, a man's acceptance or rejection in the service often depends upon what kind of an examiner he comes before. This should not be so. We should have a test that would give us a minimum of normal color vision below which no one should pass and above which we are perfectly safe to

accept. This important point has been considered in a new proposed color test, a description of which will be given at a future time.

A color test which has been used by examiners everywhere and which has for a long time been the official test in the United States Navy is that of Holmgren. More or less recently the leading nations have been gradually discarding this test and substituting others, because it is claimed that the Holmgren test can no longer be considered reliable and that color-blind persons often easily pass the test and that, just as likely as not, many who are not color blind will be rejected by it. Even in the United States most of the railroad companies which formerly relied on this time-honored test now regard it with suspicion and are adopting other and perhaps better means of detecting color blindness.

Therefore it becomes pertinent as to whether we should not carefully consider the advisability of changing the color-perception test now in use in the United States Navy, especially if the Holmgren test is as unreliable as many claim that it is. This question could be more readily answered if something better had already met with universal approval and had generally been recommended by scientists and others who had given much study and thought to this particular field of endeavor. Unfortunately no such agreement has ever been reached, but, on the contrary, a most marked disagreement exists. Not only are scientists all over the world at loggerheads over the physiology of color perception, but they are even more at variance when it comes to agreeing upon an adequate and practical method of detecting defective color perception in any given individual. A description of the method of operating the Holmgren test is unnecessary, as it is generally so well known. Therefore we can proceed at once to consider some of the objections that are raised against it.

In the first place, the colored yarns that comprise the test easily fade. Especially is this noticeable as regards the lighter shades, on which the value of the tests in a great measure depends. This is unquestionably a serious defect and unless a fresh supply of yarns are constantly kept on hand, to replace those that have deteriorated, results obtained by this test might at times be reasonably questioned. Often we have seen the light green and the light rose (purple) skeins so faded that the original color was in doubt. Under these conditions it could hardly be expected but that the results of the test would be confusing and this is exactly what happens not infrequently.

In describing his own test, Holmgren states that the dark shades of the colors could have been used equally satisfactorily for the test skeins, but for reasons given he sees fit to use the light green and light rose (purple). Had all dark shades of the test colors

been employed, the objection relative to the fading of the yarns would have been largely eliminated.

Another objection to the Holmgren test is that the skeins are so large that cases of central color scotoma are not detected. This is quite true. The London Board of Trade considered it to be of sufficient importance to warrant the necessity of using an associated lantern test by which small areas of colored light could be obtained and viewed from a distance and as these colored areas would be subtended by the macular region only, any possible error from this source would be eliminated. The writer does not consider this as serious an objection to the test as some would lead us to believe, especially in the United States Navy, where high visual requirements are demanded. Associated with central color scotoma there is always a considerable loss of central acuity for form vision and the applicant would be rejected for lack of ordinary visual acuity before the central color defect, even if present, would be a factor. It is doubtful whether the additional use of a lantern test would be of much aid in eliminating these cases, for the person examined, even if he had a central color defect, would look at the colored lights in the lantern a little eccentrically and frequently be able to name the colors correctly by utilizing his peripheral color perception. The writer once had a candidate under examination who had a small absolute central scotoma which included a defect both for form and color. He could not make out any of the letters at 20 feet on Snellen's card, except the largest letter which he figured out after a while by looking at it obliquely; but he was able to name the colors in a test lantern at 20 feet correctly. When asked how he did it he stated that he looked at the edge of the colored light and then he could make out the color, but if he looked directly at it he could not make it out. In this case he utilized his peripheral color vision to the fullest extent. When a man is in danger of losing a coveted position because of defective color sense it must be expected that he will use all his faculties to enable him to cover up the defect, and the examiner must be on his guard and not rely too much on any color test but to examine carefully into the form vision as well when central or macular color defect is in question.

An important objection to the Holmgren test is that, owing to the large variety of colors among the yarns presented for examination and the unfamiliarity with the procedure required, the candidate is often confused. This state of confusion is frequently found, and the examiner should be alert to notice it and take time to carefully instruct the candidate so that no misunderstanding will occur. It must be generally admitted that any test which leaves the candidate in doubt as to exactly what is wanted of him in order to carry out the test will operate to introduce an uncertainty as to results and will

work to a disadvantage to that extent. When the first skein of yarn that is generally given, one of a pale pure green, is presented to the candidate, and before he fully realizes that it is expected that he will select only those of pure green, he is very likely to select some of the yellow greens and possibly an occasional blue green as well, not because he does not see the pure green properly, but because he sees the green in other skeins and, in his enthusiasm to perform the test well, he includes all skeins that have green in them. Some examiners will reject candidates if they include any yellow greens in their selections, when in reality these are not confusion colors, and the fact that they are included not only does not indicate that the individuals are color defective, but rather tends to show the reverse. It might be properly said that such rejections should not be made and that the examiner would be at fault if they did occur. It all goes to show how the candidate may only with difficulty understand what is wanted of him when examined by Holmgren's method, and therefore constitutes a valid objection to the test. Occasionally the candidate will be confused when the rose (purple) test is given out, and the examiner must fully satisfy himself that this part of the test is well understood or he will in a hasty examination conclude that a defect exists when it does not.

The red skein affords little chance for misunderstanding. The greatest chances for confusion are among those candidates who are mentally rather dull and to whom explanations mean little unless they are driven home slowly and in a painstaking way. When one considers the various conditions that exist in a busy recruiting office, together with the carelessness of some examiners and the class of candidates that often come up for examination, it is hardly to be wondered at that the Holmgren test should be a confusing proposition to many. The test to be sought for is one that is so simple and plain that anyone can comprehend it instantly and thereby eliminate all chance of dealing with a confused candidate. The proposed new color-perception test well satisfies this requirement.

That the Holmgren test does not detect those cases of color blindness resulting from a shortening of the red end of the spectrum may well be considered an additional and important objection. Strange as it may seem, quite a percentage of people can not make out the color at the extremes of the spectrum as they should, although the intervening colors are all seen normally. This defect is more frequently noticed at the red rather than at the violet end of the spectrum. It is unfortunate that this should be so, for red is universally adopted as a danger signal and it is important that every one should have the ability to discern this color throughout its entire range; that is to say, a range such as is applicable to the so-called normal eye.

It being the very limit of the visual red end of the spectrum that is deficient to a greater or less extent in these cases we find as a result that it is the darkest shades of red that particularly cause trouble. These shades can not be distinguished from dark browns or dark greens, whereas the bright reds which appear further up on the spectrum are correctly seen. This fact may, in a measure, account for the almost total lack of rejections made when using the bright-red test skein in the Holmgren test, although by the rose (purple) test a defect in the red is often at the same time detected.

If a red flag is removed far enough away from the observer it can not be told from a brown, green, or black flag even by the normal eye, and it is well known that a red light under the most favorable conditions can not be made out beyond a certain distance. Under unfavorable atmospheric conditions, as in a smoke or fog, a red flag or a red light will look darker than usual, and it will require a keen perception of this color, which then becomes not unlike that found at the extreme red end of the color spectrum, in order to make it out without error. If, at the same time, the individual has a shortened perception for the red end of the spectrum he will be all the less able to discern the red color; that is to say, he will be correspondingly less able to do it than the normal individual should. In detecting these cases the Holmgren test fails; but if the examiner would augment the test as officially described by selecting several dark browns, dark greens, and dark-red skeins, and then ask the candidate to differentiate them, this objection would in a great measure be eliminated, and in this way those defective at the extreme red end of the spectrum would be detected. Unfortunately the Holmgren test yarns have very few real dark-red skeins which can be utilized for this supplementary test and hardly a sufficient number of the dark browns or dark greens to satisfactorily eliminate cases of shortened dark-red perception. The candidate who is defective only in the dark-red end of the spectrum would, in all probability, pass the Holmgren test with ease, and when placed in a responsible position at sea would be at a disadvantage compared with one not so afflicted. A test which will eliminate this chance of error is desired.

Severe criticism of the Holmgren test has been made in that it allows a moderately color-blind individual an excellent opportunity to conceal his defect by comparing the relative luminosities of the test skeins. As previously mentioned in this article, this is an important matter and constitutes a valid objection not alone to this test but to many others. Applicants who are aware that they have a slight color defect frequently procure the test yarns and practice with them and when aided by a keen sense of the relative luminosities of the colors can pass with surprising accuracy. This is especially evident when the test has been hastily conducted. If the examiner

will take plenty of time and supplant the usual routine with groups of shades of his own selection, having in mind that it is much more difficult to select colors correctly if the group of yarns from which the selection is to be made are all of about the same luminosity, he may sooner or later catch the applicant off his guard and a marked color defect be demonstrated. In these difficult cases it would be of aid if the examiner had access to several sets of Holmgren's tests which could be combined, thereby giving a far greater assortment of just the shades and luminosities desired. Few examiners have the time and patience to carry the examination thus far. When a slight defect in color perception is finally demonstrated, we are not always certain whether it is sufficient to cause rejection or not; then we are face to face with another objection to the Holmgren test in that it gives us neither a quantitative standard nor a guide by which we can tell whether the candidate is below the minimum normal requirement or not. The decision in this matter is left to the judgment of the examiner, and, as previously stated, this judgment varies considerably.

It seems in these border-line cases that opinions of various examiners so differ that it operates to make the candidate's chances of passing the test somewhat of a gamble. A record can be made that the candidate has feeble chromatic sense, but there is nothing to guide us as to whether it is sufficient to cause rejection or not except the opinion of the examiner. The writer well remembers the case of a midshipman at the United States Naval Academy who was passed by the Board of Medical Examiners as being free from color defect. After a few weeks this midshipman was rejected by the same board as being color defective, and then again later on was passed by the same board as having satisfactory color perception. This was simply one of those border-line cases on which the Holmgren test gave no information as to whether the candidate was defective to a degree which should cause rejection or not, and the opinion of the board of examiners simply varied from time to time. There is nothing strange about this; in fact, it more strange that it does not occur more often. If we had a test for our own use in the United States Navy which gave us a definite color defect limit below which it would be unsafe to accept a candidate, it would fill a long-felt want.

The London Board of Trade raised the objection that the Holmgren test was too elaborate to be carried out by a person with little or no knowledge of color vision. Most of the medical officers of the United States Navy have received special instruction in the use of this test which, together with considerable experience in its application, should qualify them as experts so that the objection suggested

above would not so readily apply in their case. Occasionally we find the test applied in a careless manner, and not infrequently the classical routine is varied considerably by different examiners. Too much latitude is unwise, as the best results are obtained only if the original directions of Holmgren are closely followed.

That too much time is consumed in applying the Holmgren test is often raised as another objection. This depends somewhat upon how much time the examiner has at his disposal. If there are a large number of men to be examined in a limited time, a condition is often found, as in a busy recruiting office, where the above objection assumes importance, and in all doubtful cases it does take time to properly conduct this test; perhaps more than a test of this kind should. A shorter method, if efficient, would be welcome to medical examiners and it is believed that this will soon be available.

Before leaving the discussion of the objections to the Holmgren test the writer wishes to state that he is of the opinion that there is much that is good that can be said of it and that, although many valid criticisms can be made, it still stands as a valuable test and is preferable to some that have been devised to take its place. A test that has been used as a standard in the United States Navy for 40 years, more or less, and with not a serious accident occurring at sea in our Navy during that time which could be attributed to defective color perception as a result of any defect in this test, certainly deserves consideration.

A test based upon Holmgren's theory and like it in having colored yarns to be selected, but differing from it in the method of its application, is that of Jennings. This test has received favorable comment from various sources. However, its value to examiners in the United States Naval Service is somewhat doubtful. In brief, it consists of two shallow square pasteboard boxes with their bottoms joined together but each box having a cover. One box contains a card on which at intervals numerous small colored yarns are fastened, all of which are greens of various shades or of confusion colors likely to be mistaken by the green blind. On another card placed in the second box the yarns are similarly arranged, but consist only of rose colors or other shades easily mistaken by the red blind. Near each colored yarn is a hole through which the individual under examination inserts a stylus which punches a record sheet placed on the reverse side of each card, thus indicating and recording for future reference the color selected. The whole plan has been ingeniously devised and arranged. A more complete description can be found in the report of the section for ophthalmology of the American Medical Association for 1914. As this test has already been distributed to many medical officers in the United States Navy it might be well to consider certain facts connected with it.

One advantage that the Jennings test has over that of Holmgren is that the colors are not soiled in handling. Also the container is not so large and bulky and the yarns are much smaller, which latter may permit of more accurately designating the central color perception. The self-recording sheet may be an advantage or not, depending upon the point of view, with the argument somewhat in favor of the latter. If a naval medical examiner on the spot is unable to determine whether the candidate is really color blind or not, certainly no "court of review" which has only the record sheet as evidence on which to base an opinion is going to be able to come to any more accurate decision. If the record sheets are to be passed upon elsewhere than at the place of examination, much loss of time, perplexity, and mistakes are sure to follow. Serious confusion will result unless the test-record sheet is placed in each box exactly as directed, and any carelessness in attending to this detail introduces an excellent chance for error. As there are four different ways in which each record sheet can be placed in each box, only one way being correct, it can be seen that not infrequently many sheets are likely to be wrongly inserted, thereby rendering the result of this examination of little value. This test also fails to detect those color defectives who have a shortening of the red end of the spectrum; in fact, it is not even as suitable as Holmgren's test for this purpose. The examiner has no opportunity to group together the darker shades of red, green, and brown in order to demonstrate whether the applicant is defective for dark reds or not, because the colored yarns are fixed on the cards and can not be removed. These yarns are about as likely to fade as those of Holmgren and this, we have already seen, is a serious factor in any test and one of the drawbacks to be considered. The relative luminosity of the test yarns in Jennings's test can be taken advantage of exactly as well as in the Holmgren test, a discussion of which has previously been considered. To us in the Naval Service the most serious defect of Jennings's test is that any bright moderately color-blind individual will, after a little study and practice with the test, be able to make his selections by memory. Any scheme where the test yarns are in a fixed position readily lends itself to memorization. This objection alone renders the test practically valueless to the naval medical examiner. The writer has also serious doubts concerning the practicability of Jennings's test. This was demonstrated in the following manner:

One hundred persons, representing 20 officers and 80 enlisted men in the United States Navy, all of whom were previously shown to be free from color defect at least to any degree which would be disqualifying for a seafaring life, were each put through the test. The result showed that 31 enlisted men and 9 officers made from one to five mistakes each, and according to the test every one of these indi-

viduals would have been a case for rejection. From this it would appear that with Jennings's test we would be in great danger of rejecting a large number of men who had sufficiently normal color perception for all practical purposes. If we were to allow each candidate one mistake for good measure, even then we would have rejected several who were not color blind. When these same officers who had made mistakes were shown their errors they then all easily passed the test correctly, and only 5 of the 31 enlisted men made mistakes after being instructed concerning their previous errors, and 4 of these were credited with only one error. Some of those who performed the test in a rather careless manner seemed to fare better than those who were more deliberate and observed each color carefully before making a selection. There are one or two shades that are most confusing to any person, especially if they have not received instruction concerning these particular shades beforehand. The writer considers Jennings's inferior to Holmgren's for Navy purposes simply because the results of the former are so confusing and so unsatisfactory, especially when memory has any opportunity to play a part, that the examiner is left very much in doubt as to who to accept or who to reject.

There are several lanterns on the market for detecting color blindness, each so devised that various colored lights are shown and the candidate under examination being required to name the colors as they are presented. It has been claimed that because a person could not match colored yarns correctly it was no criterion that he could not correctly discern colored lights in their true value. That a test with colored lights is of value in detecting color blindness is true beyond question, but too great reliance must not be placed upon such tests to the exclusion of all others. It must be remembered that at sea a sailor is often required to correctly see various colors in flags during the day as well as colored lights at night. This fact is often overlooked by zealous devotees of the lantern test.

The efficacy of all lantern tests rests on the ability of the candidate to correctly name the colors. This brings up again the objections regarding color names. Many of the candidates will look at the colored light for some time before giving a name. This takes up valuable time of the examiner, and even then the latter is never certain that the color name given really tallies with the color as seen by the eye under examination. The writer well remembers the case of a midshipman who was reported as being slightly color defective, as was shown by a careful application of the Holmgren test. To further test him out he was examined by the Edridge-Green lantern test when, to the surprise of everyone, he called all the colored lights shown by a wrong name, that is to say, he would call a red light green

and a green light red, a blue light purple, etc. This was confusing until it was found out that he was purposely miscalling the colors for, as he stated, he had figured it out that if all this fuss was made over his color vision he must be color blind, and if he reversed the color names he would probably hit them right and thus be able to pass the examination. It was later found out that his vision for colored lights was quite accurate.

Of the various lantern tests available, that of Edridge-Green, mentioned above, is unexcelled by any. The writer has used this lantern test for 12 or 13 years and considers it of special value as a confirmatory test in difficult cases. To give a full description of this test and its proper application would require more space than can be afforded in an article of the kind. In brief, the Edridge-Green lantern has several slides, some holding colored glass disks, others holding modifying glasses by which the appearance of the transmitted colored light may be made to simulate that seen in a fog or rain. Only one color is presented to the candidate at a time, therefore the candidate has no opportunity to compare it with other known colors. The lantern is electrically illuminated and well constructed. In order to obtain satisfactory results with this lantern, the examiner must devote considerable time to the study of the principles involved and learn the value of the various combinations of colored glasses that are used. It is a much more difficult test to understand than Holmgren's, and likewise presents far greater chances for error in results. It is not a test for the novice. If reasonable common sense is not exercised and the directions are not followed, the test can easily be pushed to a point where practically everyone would fail. On the other hand, it admirably lends itself to certain refinements of color testing not found in any other lantern test; for example, colored rays can be absorbed by throwing in certain combinations of colored glasses which would alter the color as observed by the color blind but which would remain the same to the normal eye. A considerable variety of modification of colors can be made by this test which would the more clearly show up the color defects in various varieties of color-blind individuals.

For use in the United States Naval Service a lantern as complex as that of Edridge-Green would only be practicable on stations ashore, and even then only in the hands of trained examiners. In localities where electricity is not available it could not be used. Should the lantern be dropped and the colored glasses be broken, they could not be replaced probably without sending to London. It is also more expensive than some of the simpler tests, and in the hands of the average examiner it is doubtful whether as accurate results would be obtained as are now acquired by the use of Holm-

gren's test. Edridge-Green has given us a yarn test, also a bead test, for detecting central color defects; the latter is most excellent, and anyone who satisfactorily completes this test certainly has no color disturbance at the fovea.

CARDIAC IRREGULARITY.

By E. U. Reed, Commander, Medical Corps, United States Navy.

Irregular heart action is frequently encountered and some forms indicate serious conditions of the heart while others have no serious prognostic importance. Only in recent years have we been able to clearly differentiate between the different forms of irregularity and our present knowledge has resulted chiefly from use of the polygraph and electrocardiograph.

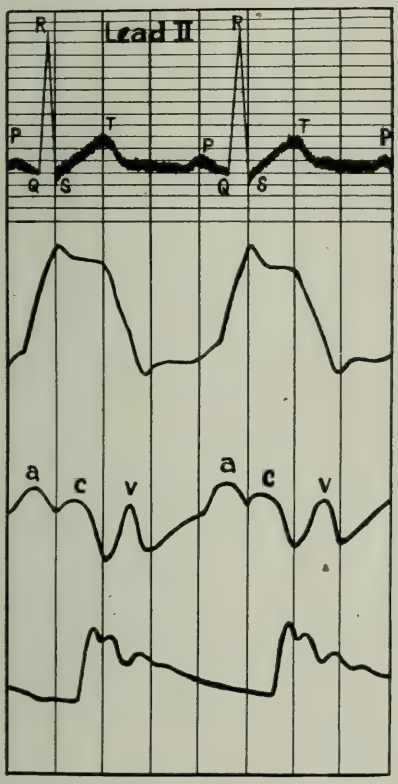
A satisfactory diagnosis can usually be made with no other instrumental aid than that of a stethoscope, if the examiner has a clear understanding of the mechanism of each of the forms of irregularity. In order to acquire this understanding a knowledge of polygrams and electrocardiograms is of the greatest value. After a few essential statements concerning the normal cardiac mechanism and the normal graphic tracings, a synopsis of the differentiation of irregularities will be presented as it has been found most useful at the Naval Medical School.

The normal cardiac excitation wave starts at the sino-auricular node (pacemaker) at the junction of the superior vena cava and the auricle. This node is subject to inhibition through the vagus nerve and acceleration through the sympathetic nervous system. From the pacemaker this wave spreads through the auricular walls and very slightly precedes their muscular contraction. The wave is received at the auriculo-ventricular node, travels along the auriculo-ventricular bundle (bundle of His), in the interauricular septum, and is released to the ventricles through the right and left bundle branches.

THE POLYGRAM.

The normal simultaneous polygraphic tracing from the apex (cardiogram), the jugular vein (phlebogram), and the radial artery (sphygmogram) shows the waves at these points resulting from cardiac systole. A time marker also records each fifth of a second.

The cardiogram may show a small "a" wave due to auricular contraction, but this is not usually recorded. The main upstroke marks the beginning of the ventricular systole and occurs one-tenth of a second before the "c" wave in the jugular tracing and one-fifth of a second before the primary wave in the radial tracing.



NORMAL GRAPHIC TRACING OF THE HEART

ELECTROCARDIOGRAM.

One-fifth second between vertical lines, which represent simultaneous points of time.

CARDIOGRAM.

Apex tracing.

PHLEBOGRAM.

Combined jugular and carotid waves.

SPHYGMOGRAM.

Radial tracing.

The jugular tracing shows first an "a" wave, due to auricular contraction, then a "c" wave, due to the pulse in the underlying carotid artery and normally beginning within one-fifth of a second after the beginning of the "a" wave. Following the "c" wave is a "v" wave the summit of which is synchronous with the opening of the auriculo-ventricular valves, and nearly synchronous with the bottom of the aortic notch in the radial tracing.

The radial tracing shows a primary or percussion wave, beginning one-tenth of a second later than the beginning of the "c" wave in the jugular tracing, then a tidal or predicrotic wave ending in the dicrotic or aortic notch and finally a dicrotic wave.

THE ELECTROCARDIOGRAM.

The normal electrocardiogram records the excitation waves immediately preceding the muscular contractions. The vertical lines show twenty-fifths of a second, with heavier lines every fifth of a second. The first deflection in each cycle is the "P" deviation, due to the passage of the excitation wave through the auricles. Within one-fifth of a second after the beginning of the "P" wave the "Q. R. S." deviations begin, and they are followed by a slow blunt "T" deviation. These deviations are attributed to the spread of the excitation wave along the auriculo-ventricular bundle and branches and through both ventricles. The three leads give the waves produced in different axes of the heart. Lead I is obtained by connecting the right arm and the left arm with the apparatus, lead II by using the right arm and left leg, and lead III by using the left arm and left leg. "R–II" indicates the R deviation in lead II, "S–III" indicates the S deviation in lead III, etc.

For more detailed information and for illustrations concerning the above subjects as well as for the broader information suggested by its title, the book Diseases of the Heart, written by Sir James Mackenzie and published by the Oxford University Press, can be most highly recommended.

Practically all irregularities of the heart action come under the following headings: Sinus irregularity, extra-systole heart block, auricular fibrillation, pulsus alternans, auricular flutter, and paroxysmal tachycardia. Often a combination of two or more may be found in the same case.

SINUS IRREGULARITY.

This form is due to irregularity of the pacemaker and is attributed to reflex disturbances of rate through the vagus nerve. The changes in rapidity of the waves usually show close relationship to the

respiratory cycle, though other reflex causes may also affect them. It probably indicates alteration in vagus tone.

The polygram shows a normal sequence and time relationship of "a," "c," and "v" waves in each cycle, showing that the impulses originate in the pacemaker and traverse the normal paths. The irregularity occurs in the varying lengths of the diastoles.

The electrocardiogram similarly shows normal sequence and form of deviations with a normal interval between "P" and "Q. R. S." The intervals between the "T" and the following "P" deviations vary.

This form of irregularity is fairly common in young adults and may occur at all ages. It may be increased by deep breathing and tends to disappear when the heart rate is increased by exercise. It is usually abolished temporarily by a hypodermic injection of atropine. It is most frequently manifest as a rhythmic increase and decrease in rate with a definite relationship to the respiratory cycle and usually produces no subjective symptoms. Occasionally the pause between two beats may be so long that dizziness or syncope result. The interval between the first and second heart sounds does not vary, but the diastolic pauses vary appreciably in duration.

Sinus irregularity does not indicate any impairment of the heart. In fact, Sir James Mackenzie considers that its appearance after an acute infection is an indication that the heart has escaped damage. An unstable nervous system lends itself more readily to emotional and toxic reflexes and these may manifest themselves as sinus arrythmia.

EXTRA SYSTOLE.

This form of irregularity is due to premature contractions originating outside of the pacemaker and indicating increased excitability of the myocardium. These premature contractions may originate in an auricle, in the auriculo-ventricular node or bundle, or in a ventricle, and, in the same case, extra systoles originating in different locations may be noted. The premature contractions are weak and each is followed by a prolonged (compensatory) pause as it has interfered with the next normal contraction from the pacemaker. Rarely the extra systole may be interposed between two normal contractions, but this is possible only when the pulse rate is quite slow. They may occur at regular intervals or only occasionally and are the commonest causes of intermittent pulse.

The radial tracing records each extra systole as a small and premature wave followed by a compensatory pause longer than the normal diastole. In the jugular tracing the corresponding "c" wave is also premature. A premature "a" wave may precede the premature "c" wave or be superimposed, producing a very large wave,

or follow the "c" wave, depending upon the location from which the extra systole started.

The electrocardiogram shows a premature "Q. R. S." complex for each extra systole with usually a disturbance in the time relationship between the "P" and "Q. R. S." deviations and followed by a compensatory pause. The premature deviations are often abnormal in form and direction and, by noting the variations in the different leads, the side from which ventricular extra systoles have started can be determined. Extra systoles are usually ventricular.

They can almost always be recognized by simultaneous palpation of the radial pulse and ausculation at the apex. A premature contraction abnormal in sound can be heard at the apex at the time of the small premature wave or intermission in the radial pulse. This will distinguish intermissions due to extra systoles from those due to heart block. Frequently a big jugular pulsation can be seen or felt at the time of the premature contraction. The extra systoles usually disappear when the heart rate is increased by exercise or otherwise and reappear after rest.

Extra systoles are most frequent in middle and advanced life and in men with some myocardial changes. They may occur at any age and, in the absence of other abnormality, they do not indicate an impaired heart. They suggest, however, some disturbance of cardiac nutrition due to toxic influences, structural changes, or overload. They may be present at intervals through a long and healthy life.

The individual may be conscious of the premature contraction, or the prolonged pause or the more vigorous contraction that often follows prolonged rest. In some cases anxiety, faintness, and even syncope may be produced.

HEART BLOCK.

This form of irregularity is due to interference with the transmission of the excitation waves. Such interference usually occurs in the auriculo-ventricular bundle or one of its branches. In first-degree block the transmission between the auricle and ventricle is delayed. In second-degree block some of the impulses fail to get through. In third-degree (complete) block none of the impulses get through and the auricles and ventricles beat independently.

In the first form the jugular tracing shows an "a"—"c" interval of more than one-fifth of a second and the electrocardiogram shows an increased interval between the "P" and "Q. R. S." complexes.

In the second form the jugular tracing shows regular "a" waves, some of which are not followed by "c" and "v" waves. Each "c" wave, however, is preceded by an "a" wave. The electrocardiogram shows similar absence of "Q. R. S." and "T" deviations after some of the "P" deviations.

In complete block the polygram shows regular "a" waves and usually regular, but less frequent, "c" waves. There is a complete dissociation between the two rhythms. Similarly the electrocardiogram shows regular "P" deviations, with no regular time relationship between them and the less frequent "Q. R. S." complexes. Ventricular extra systoles may intervene to disturb the otherwise regular rhythm of the ventricular complexes.

A right-branch block can be differentiated from a left-branch block in the electrocardiogram because of the variations in form of the "Q. R. S." complexes in the different leads. In both forms of branch block the "Q. R. S." complex, which normally occupies about one-tenth of a second, is increased in duration.

In partial heart block the pulse is usually irregular, and during the prolonged pauses no extra systole contractions can be detected. The intermissions due to extra systole are usually increased by deep breathing while those due to heart block are more often unaffected or diminished by it. Frequently a reduplication of the first or second heart sounds may be heard. Partial heart block is often lessened or abolished by exercise or administration of atropine and may be produced or increased by digitalis.

In complete heart block the ventricular rate is usually 20 to 36 per minute and the auricular rate about 72 per minute unless the auricles are in a condition of flutter or fibrillation. Complete heart block is almost always present if the ventricular rate is under 40, and should be suspected when the pulse is below 60 per minute. It is only slightly affected by exercise or atropine. The dissociation between auricular and ventricular rhythms may often be detected by simultaneous observation of the jugular vein pulsations and palpation of the radial pulse.

Heart block is usually encountered in young adults with a rheumatic history, in elderly persons with myocardial degeneration (often syphilitic), in patients suffering from acute infective diseases (partial block), or after large doses or prolonged administration of digitalis. Subjective symptoms usually result more from the associated organic changes than from the heart block itself. The ventricular slowness may produce symptoms due to cerebral anemia.

Heart block not due to digitalis indicates in practically all cases acute inflammatory or chronic sclerotic changes in the auriculo-ventricular conduction paths. These changes are almost always associated with well-marked similar changes in the myocardium and frequently with valve lesions. In an acute infective disease it may be the only sign of myocardial involvement. The prognosis depends upon the cause and the associated structural changes. Persistent heart block associated with syncopal attacks is a constant menace to life.

AURICULAR FLUTTER.

This form of irregularity is characterized by very rapid auricular contractions, 180 to 380 per minute. The ventricles can usually contract at so rapid a rate only temporarily and may respond to only part of the stimuli received, every alternate, third, or fourth impulse. This definite ratio between the auricular and ventricular contractions is usually characteristic, though the ventricles may occasionally respond at irregular instead of regular intervals.

The polygram shows a regular ratio between the "a" waves and the "c" waves and radial waves. The "c" waves are usually not manifest in the jugular tracing. The "a" waves are regular and usually occur at the rate of 3 to 6 per second. The ventricular rate may be the same or one-half, two-thirds, one-third, one-fourth, etc.

In the electrocardiogram the "P" deviations are regular, though very rapid. The "Q. R. S." complexes are less numerous in the majority of cases, but each is preceded at the normal interval by a "P" deviation, unless there is associated heart block. The forms of the deviations are constant as the excitation waves have traversed the normal paths.

Auricular flutter should be suspected in recurring attacks of tachycardia in which the pulse is fairly regular in rate and force or attacks in which excessively rapid jugular pulsations are noted, though the pulse is much slower and is regular or shows a distinct rhythm in its irregularity. The pulse of auricular flutter frequently shows alternating weak and strong waves as the ventricles become exhausted from the excessive rapidity. The diagnosis of this form of irregularity is frequently impossible without graphic tracings.

Auricular flutter is most frequently found in elderly persons with chronic fibroid changes in the heart muscle. It may occur at almost any age and indicates myocardial degeneration. Short paroxysms may occur or it may persist for months; often with resulting decompensation and frequently passing into auricular fibrillation. The onset is frequently sudden, following slight exertion. The patient is usually conscious of the tachycardia. Dyspnoea, vertigo, and even syncope may be produced. It is probably the cause of the majority of attacks of paroxysmal tachycardia.

AURICULAR FIBRILLATION.

Auricular fibrillation (delirium cordis) is characterized by complete irregularity of the arterial pulse and absence of normal auricular contractions. The auricle is dilated and unable to contract in an efficient manner and the individual muscle fibers fibrillate with resulting oscillations in the jugular tracing at the rate of 7 to 10 per second. Myriad feeble impulses crowd upon the ventricles, which

respond as rapidly as they are able with resulting rapid, irregular, and unequal contractions. Eventually some degree of heart block may develop or be produced by digitalis, and the ventricular rate may become slow and fairly regular though the auricles continue to fibrillate.

The polygram fails to show any normal "a" waves, and there is a complete irregularity in rate and amplitude of the arterial waves. Occasionally the rapid venous oscillations may be manifest in the phlebogram.

In the electrocardiogram there is absence of normal "P" deviations, and the ventricular complexes vary in rate and amplitude. Rapid and irregular oscillations may be manifest, especially during the intervals between ventricular contractions.

Auricular fibrillation can usually be diagnosed without graphic tracings. No other form of irregularity produces a pulse that is so completely irregular in the time and force of its waves. The ventricular rate is usually 90–140 per minute, but frequently some of the waves are too feeble to be manifest at the wrist and the rate there may be less than one-half that heard over the heart. On taking the blood-pressure reading there will be considerable difficulty in getting the systolic level and at this level only a small part of the waves will have force enough to get through. As the pressure is lowered, more and more of the waves may be heard at the elbow. When jugular pulsations are visible the only ones seen will be synchronous with the ventricular contractions. The patient may feel the fluttering or irregularity especially after exertion. Shortness of breath, cyanosis, and dropsy may also develop. Exercise tends to increase the irregularity.

This condition accounts for 50 per cent of all cases of persistent irregularity of the heart and is present in 60 to 70 per cent of all cases of heart failure with dropsy. It is most often encountered either in young adults with rheumatic valve lesions or in elderly persons with chronic myocardial degeneration. It may be found in pneumonia, diphtheria, or malignant endocarditis and in the terminal stages of many exhausting diseases. It usually indicates serious myocardial degeneration and is quite often associated with mitral stenosis.

The prognosis depends upon the cause and what we can determine about the efficiency of the heart muscle. When the pulse is rapid and the heart dilated the prognosis is very poor. Fibrillation usually comes on gradually and persists for the remainder of the patient's life. It may appear suddenly and for short periods only, but it tends to recur and finally becomes permanent. These patients seldom have definite attacks of angina pectoris. It is in cases of fibril-

lation that the digitalis group of drugs produces its most excellent results and under proper dosage and management they may live for a number of years.

PULSUS ALTERNANS.

Pulsus alternans is characterized by alternately strong and weak ventricular impulses occurring at regular intervals. It indicates depressed contractility. The ventricles are not able to respond with equal force to the impulses received.

The polygram will show regular rhythm but alternating heights of the arterial waves. The electrocardiogram shows alternation in the amplitudes of the "R" or "T" deviations, or both; especially in height.

Graphic tracings are usually needed to diagnose this condition. Such subjective symptoms as may be present are usually due to associated conditions. Use of the arm band of the sphygmomanometer may be made to bring out the difference in strength of the alternate pulse waves.

It usually occurs in patients past middle life with some degree of myocardial degeneration. It may be found in rheumatism, pneumonia, or other acute infections resulting in cardiac exhaustion.

Pulsus alternans is of great prognostic importance. Its significance is particularly serious if it occurs in persons with known cardiac disease when the heart is beating at about the normal rate. It is often associated with attacks of angina pectoris and paroxysmal tachycardia. Its temporary appearance after tachycardia will vary in its significance with the cause of the tachycardia. Depression of contractility by digitalis may occasionally produce it.

PAROXYSMAL TACHYCARDIA.

Paroxysmal tachycardia is characterized by abrupt onset of a rate of 150 to 300 per minute and its equally sudden cessation after a period that may last only a few minutes or may persist several weeks. The impulses are believed to originate in the auricles or ventricles and not in the pacemaker.

The polygram and electrocardiogram show that these paroxysms may be due to different causes, but nearly all attacks can be identified as auricular fibrillation, auricular flutter, or repeated extra systoles.

These forms of tachycardia, unlike those originating in the pacemaker, are not markedly effected by exercise. The pulse may be regular or irregular, depending upon the cause. The blood pressure is usually low and the jugular veins distended and rapid pulsations

visible. Weakness, pallor, dyspnoea, precordial pain, nausea, vomiting, cyanosis, and edema of the lung bases may develop.

The etiology is similar to that of its usual causes. In some cases no evidence of organic change can be found. Intestinal toxemias, reflex irritations, and neurasthenic states may be attended by such attacks. Exertion, emotion, and flatulent distention often usher in the attacks.

Death during an attack is unlikely unless the attack is much prolonged. Return to the normal rhythm is usually sudden and attended by rapid disappearance of subjective symptoms and passage of considerable quantities of urine and flatus. Cases presenting most alarming symptoms may improve with startling rapidity after cessation of the abnormal rhythm.

This article is intended as an introduction to a very interesting subject for those who have not had previous opportunity to study it and as a quick reference for those who have infrequent use for such information.

THE HANDLING OF RECRUITS AT THE RECRUIT DEPOT, MARINE BARRACKS, PARRIS ISLAND, S. C., WITH SPECIAL REFERENCE TO PHYSICAL EXAMINATION.

By J. C. PARHAM, Lieutenant Commander, Medical Corps, United States Navy

Recruits arrive at Parris Island twice daily. Immediately after arriving they are examined by a medical officer for evidences of contagious and infectious diseases. This examination having been completed they are given dinner or supper, depending upon the hour. The usual hours of arrival are 11 a. m. and 7.30 p. m., but in case of delay in trains, no matter what the hour, the recruit always finds a well-prepared and attractive meal awaiting him. This is in line with the general policy of the recruit depot of making the conditions surrounding the man while awaiting enlistment as attractive as possible in order that he may not become discouraged and repent his decision to enlist in the Marine Corps. In furtherance of this general policy the recruit, while awaiting final disposition of his case, is supplied with athletic gear and the unlimited use of an athletic field. Moving-picture shows are given nightly, the show consisting of two comedies and a feature picture. This carries the recruit through the day. After breakfast he reports to the medical officers for final examination, which is generally completed by noon, except in the case of men requiring additional observation and examination. He is now given cowpox vaccination.

Physical examination.—Physical examinations are conducted in a ward of one of the standard type regimental sick bays. The equip-

ment includes scales, measuring devices, electrical instruments for the examination of eyes, ears, etc., vision test sets, etc., conveniently arranged. The Medical Department personnel of the recruit depot consists of two medical officers, a pharmacist, and several hospital corpsmen. One hospital corpsman is detailed as recorder. Recruits are stripped and each man is given a number; this is painted on his chest with tincture of iodine, and while in the examining room he is known by this number. This is done to facilitate the work of the recorder of the examination and to prevent confusion and error in case two or more men have the same surname. They are then lined up and addressed by the medical officer. Considerable importance is attached to this address, since cold, hard facts are told in terms easily understood by any recruit. The lecture lasts for 15 minutes and the following points are brought out and emphasized:

(*a*) Duty in the Marine Corps involves hard work as well as pleasure; marines play a man's game, and in the Marine Corps there is no place for the weakling. The service is not for the purpose of making men out of boys but of making better men out of good men.

(*b*) They are reminded of the fact that they signed a paper at the recruiting office before being sent to Parris Island in which each stated "I have nothing wrong with my health or body that the doctor did not find when he examined me." It is suggested that perhaps they considered the signing this paper lightly, or perhaps had not realized that some physical defect or ailment might rapidly grow worse or increase as the result of unaccustomed physical exertion and training at the recruit depot—such as an ear that runs occasionally, a stiff joint that is not noticeable but that is not exactly right, a fit or fainting spell that the applicant has had, the scar of an old operation that has given trouble, or old fractures that give trouble. In this manner each portion of the body is touched upon and the more common injuries and ailments affecting the portions under discussion are mentioned.

(*c*) They are then told that they will be required to swear that they are physically fit and the penalties of perjury are explained to them. They are told that the Marine Corps does not cure fits or fainting spells, but that, on the contrary, physical defects are liable to be made worse by the period of training each man will undergo. They are told that bed-wetting will be detected, that venereal disease can not escape observation, and that the copy of the finger prints taken at the recruiting office will give the examiner accurate information of previous service in the Army, Navy, or Marine Corps, and that by this means a man who has been discharged on account of physical disability will be detected and punishment meted out to him if he conceals the fact. The lecture is concluded by inviting the ap-

plicants to render any statement they may care to make; they are told that the present time is the last opportunity that will be afforded them to "come clean," and that no punishment attaches to confession of facts they may have forgotten to tell the officers at the recruiting office or to which they attached slight importance, but that, after they leave the examining room and are sworn in, any facts that have been concealed will almost surely be detected and punishment administered.

Following this, each applicant is asked individually if he wishes to tell the examiner anything. Notes on former disease or injury, as related at this time, are made by the recorder and used to bring this information to the examiner's closest attention and to aid him during the subsequent examination.

The following routine of actual examination, which comes next, has been developed by long experience and permits the rapid and thorough examination of large numbers, such as are handled at the recruit depot almost daily.

(*a*) Applicants are formed in a line and numbered consecutively, No. 1 on the end. The recorder enters opposite each man's number the information given by the medical examiner.

(*b*) The line now passes before the measuring stick and over the scales, the examiner calling out: "No. 1, height —, weight —, chest —, expiration —, inspiration —."

(*c*) These having been taken, No. 1 toes the 20-foot line, and his vision is recorded, followed by No. 2, 3, etc.

(*d*) This being done, color vision is determined, both medical officers examining in order to expedite this process, which is, at best, time consuming. In this test Holmgren's method (colored worsted) is routinely used, the Jennings test being employed for confirmation and record in case of color-vision defects.

(*e*) The line is again formed, and hearing is tested.

(*f*) Following this, the examiners start through the line. A rapid survey is made of the recruit's head for evidence of old fractures, scars, and deformities; next the eyelids are everted and trachoma, corneal opacities, pterygium, etc., looked for; then comes a rapid palpation of the cervical and epitrochlear lymphatic glands, mastoid region, and thyroid gland, together with examination of the nose, teeth, and throat.

(*g*) The applicant then clasps his hands above his head, separates his feet, and is instructed to cough, and evidences of inguinal, umbilical, or post operative ventral hernias are sought.

(*h*) While in this position the external genitals are carefully examined.

(*i*) The applicant resumes the normal position and a rapid survey of the entire body and limbs is made for evidence of operation, or other scars, skin lesions, edemas, old fractures, deformities, varicose veins, etc.; and, lastly, the condition of the feet is observed for the presence of deformities, callosities, bunions, flat foot, and pes cavus. All feet are not measured. An experienced examiner can readily judge from a very rapid inspection of the foot as to whether it is absolutely good, hopelessly bad, or requires careful examination and measurements before decision. In determining flat feet the following points are noted, the applicant standing normally: The angle of the foot with the leg, in the antero-posterior and lateral planes; the prolongation of the line of the tibial crest; curvature, if any, of the tendo Achilles; the location of the scaphoid tubercle with relation to Feiss's line; the amount of descent of the tubercle upon placing weight on the foot, and, lastly, the imprint of the foot. The latter can be determined by noting the points of contact of the foot with the floor as shown by soiling after walking and standing on the bare floor of the examining room. This point, when considered alone, is of no value, since, as is well known, pes cavus will give an impression indicating an excellent foot while, on the contrary, a fat foot of excellent bony and ligamentous structure may give an imprint indicating marked flat foot. For these reasons the other points mentioned are of first importance, showing, as they do, the condition of the ligaments and articulations of the bony structure.

(*j*) These steps being completed, the examiners pass behind the line of applicants who bend forward touching the floor with hands and with feet spread apart. The spinal processes of the vertebrae are palpated and evidence of anal fistula, hemorrhoids, etc., sought.

(*k*) This procedure is followed by an examination of the ears using the electric otoscope.

(*l*) Following this comes the examination to determine the mobility of joints. The movements prescribed in the Manual for the Medical Department of the Navy are employed.

(*m*) Next the lungs and heart are carefully gone over. This is the most time-consuming of any of the procedures undertaken, especially in view of the large percentage of men who are borderline cases. The examination of the heart is concluded after making the applicant do a vigorous "full sweep" for a period of one minute. This is highly important, since under the influence of strenuous exercise information as to the condition of myocardium and valves is often obtained that can be ascertained in no other way, i. e., murmurs of organic origin, irregularity of action, response to effort, and time and manner of return to normal.

(*n*) During the period of the examination a rapid fire of questions is directed at the applicant for the purpose of detecting any speech defect, ascertaining family and personal history, and educational qualifications. From his answers and manner of replying opinions are formed as to his mental status.

(*o*) Throughout the examination the recorder stands by and notes any defect or abnormality discovered by the medical officer. If the defect is such as to constitute a bar to enlistment, the applicant is marked "Reject"; if of less import, the applicant appears before both examiners upon completion of the routine examination, when the defect is carefully examined and, after discussion, decision is made as to the final disposition of the case. Similarly, all candidates marked "Reject" are given a final examination by both examiners with special reference to the discovered defect before final action is taken. It will be understood that all minor defects are recorded and that upon summarizing these defects they may, in the aggregate, constitute sufficient cause for rejection, even in the absence of a major defect.

(*p*) The information required for health records is then obtained and recorded on a form, printed on regular size, official correspondence paper, and it bears on the left a copy of the descriptive list from the health record. The notes, made by the recorder during the examination, are entered on the wide margin to the right and later transferred to the smooth descriptive list in the health record. Notes would embrace slight spinal curvature, slight varicocele, a relaxed inguinal ring, perianal skin tags, feeble chromatic sense, etc., and conditions that should be noted for record under "Marks and scars." Upon completion of this form it is sent to the hospital corpsman in charge of records, where it is used in the preparation of the original and the copy of the descriptive list of the health record. It is then attached to the health record and placed on the medical officer's desk to be used for checking the health record.

(*q*) Requisite entries are made in the service record book and finger prints taken. The recruit who is physically qualified now passes to the line recruiting officer where his enlistment is completed, unless disqualifications other than physical are discovered.

Those who present physical defects are held for special examination. This may require but a few minutes, or a period of hours on successive days. The methods employed in determining an applicant's fitness are only limited by the examiner's professional skill and the paraphernalia available at the recruit depot and the naval hospital. Recruits with heart lesions have blood-pressure readings made before and after exercise, they are put through the usual tests to determine whether a lesion is organic or functional, and whether of the

valves, nervous structure, or the musculature. Urinalysis is done in these cases. Eye cases are carefully refracted and examined with the ophthalmoscope when necessary. Ears are carefully examined and in case of a moist drum in which a small perforation is suspected, but not visible, the simple expedient of placing one end of a rubber tube in the applicant's ear and the other end of the tube in the examiner's ear and having the applicant inflate the middle ear is employed. This test is of value only when positive, as air can be heard to whistle through the drum; there is always the possibility that the applicant can not inflate the middle ear, or greatly desires to enlist and will not inflate it. Under these circumstances the tube is left in situ and a eustachian catheter passed into the canal and the middle ear inflated with a Politzer bag when, if a perforation exists, the passage of air through the drum can be plainly heard.

In cases suspected of having tuberculosis, sputum, if obtainable, is examined and temperature charts started to continue until the examiner is satisfied of the nonexistence of the disease. These patients, if borderline cases, are also X-rayed.

In brief, every case is gone into thoroughly if any suspicion exists that the defect may be such as to require rejection.

Before being sworn in all applicants are given a lecture by the commanding officer of the recruit depot. The history of the Marine Corps is sketched and the attempt is made to lay the foundation upon which loyalty to the Government and service and "esprit de corps" may be subsequently erected. At this time the life of the marine is described and the rewards for faithful and conscientious service are set forth and contrasted with the penalties and odium attaching to the military offender. The men are now sworn in and equipment, clothing, arms, etc., issued. This being done they are given the first injection of typhoid prophylactic and transferred to the detention camp in the training station, where typhoid prophylatic and cowpox vaccination are completed during the period of detention.

The day after reporting at the detention camp the men report by companies to the dental officer, teeth are examined and dental records prepared. Immediately thereafter dental work on the company begins and is continued until every man has all necessary dental work completed. For this purpose men report in squads of from 6 to 8 in order to interfere as little as possible with the recruit training.

It will be noted that the routine employed in the physical examination covers every portion of the body and is substantially that contained in chapter 12, Instructions to Medical Officers, United States Navy. The routine may be modified to suit the individual examiner, but it is of the utmost importance to have a fixed routine of examination, since otherwise the examination will not always in-

clude every portion of the body and defects will be overlooked. The examiner should establish one routine and follow it unvaryingly until it becomes automatic.

It is believed that the greater portion of rejections at the recruit depot are the result of a lack of routine in examination. When an applicant, after being examined by a medical officer on recruiting duty, is found to have a discharging ear, with perhaps inspissated wax that gives evidence of long aural residence and requires the undivided attention of the medical officer for an hour or more to effect its removal, the conclusion is easily reached that the medical officer at the recruiting station has not examined that ear. This is not a far-fetched example; fully 5 per cent of the applicants received at the recruit depot have cerumen inspissated to an extent that is proof positive that the tympanum was not seen by the medical officer at the recruiting station. The usual alibi advanced in lieu of explanation is "this defect was not discovered at this office." Comment is unnecessary.

A survey of the Forms X submitted from the recruit depot shows numerous rejections for conditions such as undescended testicle, otitis media with perforation of the tympanum, large hydrocele, large varicocele, ankylosed joints, hernias, deformities of feet sufficient to interfere with the performance of duty, marked enlargement of the thyroid gland with evidence of thyro-toxicosis, defects of vision, color blindness, marked cicatricial contraction of skin and muscle interfering with motion, marked underweight, patients in the last stages of tuberculosis, etc. The conditions enumerated do not admit of conflict of opinions, they are positive indications for rejections and, as such, should never pass any medical officer who is conscientious enough to carefully examine an applicant. Defects such as heart lesions, incipient tuberculosis, slight varicose veins, slight thyroid enlargement, hemorrhoids, moderate flatfoot, relaxed inguinal rings, spinal curvature, etc., are not included in the foregoing, since they admit of differences of opinion between the medical officer of the recruiting station and the medical officer of the recruit depot.

It may be stated that the majority of rejections are due to two general causes, carelessness and failure to observe instructions.

Instructions governing the physical examination of recruits and applicants are explicit and should be thoroughly known to any medical officer on recruiting duty, and they should be followed to the letter.

Gatewood remarks that the health of the service is primarily in the hands of the recruiting officer. The writer has constantly observed the truth and aptness of this statement and suggests it as a slogan for every medical officer examining men for the Navy and Marine Corps. It may be further stated that the annual appropriation for

pensions accurately mirrors the thoroughness in performance of duty of medical officers on recruiting duty. Careful examination, following an established routine, will prevent 80 per cent of the rejections for physical defects at the recruit depot.

Orders issued by the Major General Commandant under date of March 15, 1921, direct that henceforth the minimum height and weight requirement shall be 65 inches and 130 pounds, respectively, and that ordinarily no waivers will be submitted, except in the cases of former marines. These orders have been, in many instances, disregarded. In the case of reenlistments in the Marine Corps the man is sworn in at the recruiting office and the enlistment is thereby completed; but he is transferred to the recruit depot where he is given the routine examination. Many reenlisted men, so received, present physical defects that are positive contraindications to enlistment or reenlistment and for which even waivers have not been requested.

Again, it is noted that waivers submitted from recruiting stations do not accurately set forth the physical defect. For instance, a varicocele will be described as slight or moderate, whereas, it is very large; underweight will be grossly misstated; curvature of the spine will be represented as slight, whereas it is marked; varicose veins will be represented as slight and the applicant present marked varicocities with evidence of old ulcerations, etc.

Medical officers should realize that the fact of a defect being waived does not influence the medical officer at the recruit depot when the condition has not been accurately represented. In these circumstances the bureau is advised of the actual conditions and requested to cancel the waiver or to waive the disability, depending upon its extent. Men with waivers are not enlisted under any circumstances without the prior approval of the bureau unless the waiver accurately describes the condition. Again, many men are sent to the recruit depot with defects for which waivers *should have been requested at the recruiting station.* It should be realized that an accurate description of a physical defect transmitted to the bureau, via telegraph, is less expensive by far than transporting the applicant to Parris Island, where he may be rejected and returned at Government expense to the recruiting office or held for several days at Government expense while awaiting action on a waiver submitted from Parris Island.

At the present time medical officers are evidently interpreting the Major General Commandant's orders of March 15, 1921, with reference to waivers as meaning that waivers are no longer necessary. Applicants with physical defects that should be waived continue to arrive.

A brief summary of the cost in connection with rejected applicants during the last fiscal year is presented:

Total applicants rejected for military and physical reasons	1,298
Total applicants rejected for physical reasons	668
Percentage applicants rejected for physical reasons	51.46
(*a*) Railroad fares, meals, and sleeping accommodations for rejected applicants	$54,272.98
(*b*) Rations at recruit depot	6,360.20
(*c*) Return transportation furnished rejected applicants	32,303.42
Total	92,936.60
(*d*) Total cost of applicants rejected for physical defects only	[1] 47,825.17
(*e*) Average cost per rejected applicant	71.60

The foregoing does not include the very considerable item of telegrams from Parris Island in connection with waivers, ascertaining facts regarding criminal history, previous military service, etc. With the service ration at 50 cents, telegrams, while expensive, are far less so than rationing a man for the days necessary to obtain information via the slower process of the mails.

Attention is invited to the fact that the foregoing summary of expense in connection with rejected applicants does not include the cost at the recruiting station of rationing at 75 cents per meal and providing sleeping accommodations for applicants while awaiting transfer to the recruit depot. While figures covering these expenditures are considerable, they are not available.

In conclusion, it should be stated that the sole object of the medical examiners of the recruit depot is to certify as physically fit for enlistment only those men who in their opinion are capable of performing the duties of a marine and who are free from defects liable to place them in a pensionable status. To this end the very earnest cooperation of the entire recruiting staff should be directed. It is believed that the duty performed by a medical officer at a recruit depot is a specialty, and that after a short period of such duty he gains knowledge of physical defects, personalities, etc., that can not be had elsewhere. At this recruit depot the senior medical examiner is a member of all boards of medical survey, and thus he observes the men he has previously examined and who have been unable because of physical defects to complete the period of training. Correlating the information obtained in the examining room and that obtained as a member of a board of survey gives an insight into physical defects that is of incalculable value to the examiner and impresses upon him the importance of every medical examiner making a careful physical examination of each applicant who comes before him in the recruiting office.

[1] Applicants rejected for physical defects have transportation furnished to the recruiting station, whereas, the majority rejected for military reasons are not furnished return transportation. This accounts for the apparent discrepancy in cost when the percentage rejection for both causes is considered.

FOUR CENTURIES IN THE TREATMENT OF SYPHILIS.

By L. W. Shaffer, Lieutenant Medical Corps, United States Navy.

ORIGIN OF SYPHILIS.

According to the work of Thomas Rangonius (1508) the great epidemic of syphilis first appeared in Galacia, Spain, and was therefore named "Morbus Galecum." It raged throughout Spain in 1494, and in the same year the whole of Italy was affected. In 1495 France, Germany, and Switzerland, became the sites of virulent outbreaks; Holland and Greece in 1496, England and Scotland in 1497, Russia and Hungary in 1499. The disease was first recognized in India after the arrival of the crews of Vasco da Gama (Portuguese) at Calicut in 1498. In China according to U-Pin (1550), syphilis broke out in epidemic form in Canton in 1505, as the result of the visit of a European trader.

Opinion has favored the theory that syphilis was introduced into the Old World by Christopher Columbus on his return from America. Its spread over Europe was facilitated by the armies of Charles VIII of France, made up of mercenaries from many countries, including Spain, both during its invasion of Italy in 1494, and after its disbandment in 1495. It is probable that Columbus was the first to introduce syphilis into the Old World, or he may have introduced merely a new and virulent strain.

THERAPY OF THE EARLY PERIOD.

Syphilis had probably been known in Espanola (Haiti) from time immemorial. At the time of the arrival of Columbus the Indians were already in possession of a highly complicated, rationally developed and deduced method of cure of this ailment, the details of which Diaz de Isla learned in the year 1504 from a translation. This consisted chiefly in treatment by guaiacum and other vegetable drugs, in conjunction with hydro-therapeutic, dietetic, and climatic methods of treatment.

The first manifestations of the great epidemic of syphilis of the fifteenth century were not treated at all, having been a complete surprise to the physicians of that period. It was considered disgraceful for a practitioner to occupy himself with such a disease. This was mainly due to their complete ignorance of a disease unknown to Hippocrates, Galen, or Avicenna. It was treated by druggists, herbalists, and imposters of all kinds. The abuse was so great that at last physicians became ashamed of neglecting their duty and undertook the treatment of the scourge. This consisted, at first, in diet, hygiene, bleeding, laxatives, juices of herbs, together with baths, sweating, and various kinds of ointments.

Mercury came into use very early. Introduced into therapeutics by the Arabian physicians Rhazes, Avicenna, and Mesue, it was employed in the treatment of various cutaneous affections. Analogy naturally led to its employment for syphilitic eruptions. Various forms of mercurial ointments were proposed by different physicians as early as 1497, especially by Berengario da Carpi and Jean de Vigo. In a satirical poem by G. Samarissa, of Verona, mention is made of the use of mercury in 1496. At the very first the effects of this agent were dreaded and the doses given were small, but the dosages used rapidly increased, together with excessive and repeated inunctions until the remedy became worse than the disease. This method of treatment then fell into discredit, to which the importation of guaiacum from Haiti (1508–1517) further contributed. From that time dates the famous discussion of the advantages and disadvantages of the mercurial preparations.

Mercury was at first used externally only. There were four ways of using it, says Astruc; as a plaster or cerate, as a wash, as an ointment or inunction, and in perfumes (fumigation). About the year 1535 Pietro Andrea Mattioli first ventured to give mercury internally administered in the form of red precipitate. Following discoveries in chemistry, many different forms were administered, but regrettable excesses in dosage were committed. Convinced that salivation was necessary as a price of health, and was the only means of eliminating the poison of the disease, they sought above all things to produce it. It was not until the first part of the eighteenth century (Chicoyneau 1718) that an effort was made to demonstrate the inutility of salivation in the treatment by mercury, but this reform did not triumph for many years.

Guaiacum was known in Spain as early as 1508, and according to Delgado reached Italy and Germany about 1517. It then came into rapid general use. It was used as an infusion in various strengths, combined with a strict diet. Among other sudorific woods in popular use were holy wood from India, and cinchona, introduced into Europe about this time (1536–37). Then came the use of sarsaparilla, sassafras, canella bark, saponaria, bittersweet, germander, hyssop, citron, oranges, and lemons. However, the sudorific woods and plants soon lost much of their reputation, and by 1564 Fracanziani states that many clever physician had been obliged to have recourse again to mercurial inunction. In the seventeenth century guaiacum was still in use, but the physicians of the eighteenth century, with few exceptions, abandoned it almost completely and had recourse to mercury. Astruc declared, like many others, that the sudorific woods were incapable of curing any but local and commencing venereal diseases.

The identity of the different venereal diseases, and the modes of attack and characteristics of syphilis, were fairly well determined by scientific study on the part of numerous workers of this period, including Fernel (1496–1558), Gabriele Fallopio (1523–1562), Ambroise Paré (1510–1590), Gregory Horst (1575–1636), Lancisi (1654–1720), and Jean Astruc (1684–1766). The publication in 1736 of Jean Astruc's classical work, De Morbis Veneris, constitutes a landmark in the history of syphilis. He contributed little, but brought together all the existing knowledge of the subject.

THE HUNTERIAN PERIOD.

The culminating point in the period of retrogression in the scientific knowledge of syphilitic affections is probably occupied by John Hunter, who, inoculating himself with the pus from virulent gonorrhea, produced a chancre as well as constitutional syphilis, from which he concluded that the virus of all three diseases, gonorrhea, chancre, and syphilis were identical.

In regard to treatment, Hunter says: "As the three forms of venereal infection, gonorrhea, chancre, and the lues venera, all arise from the same poison, it would be natural to expect that one medicine, whatever it would be, would cure all forms of this disease. But we find from experience that this does not hold good; for one medicine, that is, mercury, cures only the chancre and the lues venera, and the gonorrhea is not in the least affected by it; and what is still more remarkable is that the two which it cures are in no respect similar, while the gonorrhea, which it does not cure, is similar in some respects to the chancre, which it does cure.

"If there is such a thing as a specific, mercury is one for the venereal disease in two of its forms. Yet mankind are in pursuit of other specifics for the disease, as if specifics were more common than diseases; while at the same time they are too often contented with the common mode of treating many other diseases for which they have no specific" (1).

The history of syphilis from Hunter's time (1728–1793) was one, first of confusion, then of gradual groping for the light.

In a work written in 1661 Simon Pauli gives an account of the cure of a case of syphilis by the use of opium, but it was not until near the end of the eighteenth century that opium acquired all at once a certain popularity in the treatment of the disease, and came into use in massive doses. About the same time oxygenized substances came into wide but transient use. The treatment without mercury, so popular in the first quarter of the nineteenth century, was due probably to the failure to differentiate between various venereal diseases, following the ideas of Balfour, Hunter, Adams,

and Carmichael. It was soon followed by a return to the general recognition of mercury, along with the better differentiation of venereal diseases, and the disproving of the Hunterian theories.

MODERN SYPHILIS.

The history of modern syphilis begins with Philippe Ricord (1799–1889), the great experimenter and pioneer in genito-urinary diseases. He disproved John Hunter's theories, worked out the three stages of syphilis, emphasized the differentiation between hard and soft chancres, and helped prove the contagiousness of secondary syphilis. He, with his pupils and followers, established the fundamental part, and the larger part, of our present knowledge of syphilis.

In therapeutic lines Ricord is the founder of the French school of mercury by mouth medication. He preferred the use of proto-iodide pills, and says of their use: "The most powerful way of action is by way of the intestinal canal, the application by the skin is far inferior and ought only to be employed when the bad state of health of the digestive organs will not allow the direct introduction of the medicament" (2).

Iodine and its compounds had not long entered the domain of therapeutics when they were employed for the cure of syphilis. Inspired by the practice of Gertanner, who gave burnt sponge for venereal ulcers of the throat, Martin, of Lubeck, conceived in 1821 the idea of substituting iodine for the sponge and obtained good results from it. Wallace, of Dublin (1834), has the honor of having been the first to employ iodide of potassium, to fix its dosage, and to point out the indications for its use. He thereby definitely introduced iodine into the therapeutics of syphilis and placed it almost on a level with mercury.

The idea of the so-called "syphilization," promulgated by Diday (1812–1894), was essentially the cure of syphilis by repeated inoculations of the same infected person with syphilitic virus, until immunity was produced. It was studied by many workers, who failed to obtain any therapeutically valuable results. These studies, however, resulted in the knowledge that the products of syphilis are only rarely inoculable upon the patient, or upon other syphilitic individuals.

The influence of Ricord gave rise to two great French schools of syphilology; those of Diday and of Fournier. It was largely through the work of these great syphilographers and their disciples that the clinical knowledge of syphilis has been brought to its present state. Diday gave his attention to the problems of congenital syphilis, while the work of Fournier ranged over the whole field of syphilis, and he

was probably the greatest clinical syphilographer that the world has produced.

Fournier advised that the treatment of syphilis be carried out "with truly active and curative doses of mercury and potassium iodide, the duration of treatment not to fall below three or four years however benign the original diathesis may have been." This he considered the necessary minimum, not, as he says, to cure the disease but to avert its dangerous manifestations both for the present and for the future. In addition he advised a course of iodide treatment every two or three years to keep the disease in check and to hold the ground gained (3).

DEVELOPMENTS OF THE TWENTIETH CENTURY.

The most astounding advance in the diagnosis and treatment of syphilis came with the scientific discoveries of the early twentieth century. Metchnikoff and Roux in 1903 succeeded in transmitting syphilis to monkeys. On March 3, 1905, Fritz Schaudinn discovered the origin of syphilis in one of the protozoa, the *Spirochæta pallida*. In 1906 Wassermann applied the Bordet-Gengou phenomenon of complement fixation to the diagnosis of syphilis. The commanding intelligence of Ehrlich applied ideas of chemotherapy, with the startling result, salvarsan, in 1909 (4).

The ingenious suggestions of Swift-Ellis, on the use of the intraspinal salvarsanized serum, and the finding of *Spirochæta pallida* in paretic brain tissue by Noguchi and Moore became known in 1912. The knowledge of the colloidal gold reaction, obtained from the ideas of Thomas Graham concerning colloids and developed by Szigmondi, was effectively applied by Lange in 1913.

Until the discovery of the *Spirochæta pallida*, there were two opinions as to when to begin the general treatment of syphilis. In one the specific therapy was begun as soon as possible after the recognition of the primary affection; in the other, it was believed necessary to wait until the appearance of the secondary symptoms. This latter view was held by the majority, because they believed that the action of mercury was more lasting in the general syphilitic stage, that it had never been possible to arrest the disease by early treatment, and, above all, that it was impossible to make an absolute diagnosis before the roseola appeared. This hesitation in diagnosis, however, has disappeared with the discovery of the *Spirochæta pallida* and the Wassermann reaction. Hoffman was able to prove that the blood from syphilitic patients taken two weeks before the appearance of the general eruption induced syphilis in apes. Neisser proved by inoculation experiments that the internal organs of apes contained syphilitic virus at the time of the appearance of the primary lesion and often much earlier. It is therefore necessary

to begin the general treatment as soon as syphilitic infection has been proven by the presence of the *Spirochæta pallida*.

Unfortunately the great expectations of salvarsan, as a result of the first enthusiastic and favorable report of Alt, Wechselmann, and others, were only partly fulfilled. It was soon learned that Ehrlich's arsenic preparation did not effect a complete cure in the sense he anticipated, and certainly this end can not be obtained, and should not be expected in such a chronic and complicated disease as human syphilis. Armed with the laboratory aids to diagnosis and the addition of salvarsan and its allied preparations, we have then to see what the last 10 years have brought forth regarding the therapeutic management of syphilis.

PRESENT STANDARDS IN THE THERAPY OF EARLY SYPHILIS.

Realizing that the hope of a radical cure of syphilis by a few injections of salvarsan was impossible, and yet recognizing its extreme value in the treatment of syphilis, many methods and systems of treatment have been advocated. Time already has proven many of these inadequate or dangerous. When it is realized that salvarsan has been in general use in the treatment of a disease so chronic and complicated for only 10 years, it is easy to see that many years of observation of treated cases and large numbers of well-kept records with each of the systems now in use, will be necessary before any standard of treatment can be universally adopted. In this paper an endeavor has been made to bring together some of the various methods of treatment as advised by physicians of wide experience. Abortive treatment and that of early syphilis only have been considered, as the general subject is too large to cover in a paper of this nature.

At the present time the temperate opinion of the world recognizes that the prompt eradication of syphilis by specific treatment is only likely to be successful in the early weeks of the disease. If the disease is recognized within the first 10 days after the appearance of the chancre, vigorous treatment then begun has an excellent prospect of aborting it. This prospect rapidly diminishes after the first 10 days, and after the disease has become systemic to the point of producing the secondary eruptions, the prospect of quick cure by specific treatment with salvarsan and mercury has almost vanished.

MERCURY.

The moderate systemic and temperate use of mercury developed under the French school, led by Dupuytren, Ricord, and Fournier, and by Jonathan Hutchinson in England. The intensive methods of administering mercury in vogue at the present time, by inunction and

particularly by injection, are due to the insistence of the modern German school.

Three types of treatment with mercury have obtained general recognition—the continuous, the symptomatic, and the intermittent forms. The intermittent treatment, now the most widely accepted method, alternates the periods of intensive therapy with periods of rest. Certain considerations in regard to the physiological or toxic effect of mercury on the blood, kidneys, gastrointestinal tract, mouth, and teeth seem to make the intermittent form the most rational.

When administering mercury by mouth the various preparations are probably of value in the following relative order: Mercury with chalk, bichloride of mercury, and the protoiodide and biniodide of mercury. There can be little question but that the efficiently applied inunction is the best available method for the administration of mercury in syphilis and has the advantage that it is not cumulative. When using mercury by injection the employment of the soluble salts has the advantage of fixed dosage, rapid availability, and ease of control of the toxic symptoms should they arise. They have, however, to be administered at daily or at the most short intervals, which constitutes their main objection. The insoluble salts are administered at intervals of from five days to one week, but they are distinctly cumulative, and their absorption is slow. The studies of Schamberg, Kolmer, and Raiziss show that at the end of six or seven weeks almost 50 per cent of the mercury may remain unabsorbed at the site of injection and that weekly administration leads to cumulation of the drug in the tissues. For rapid effect with little cumulative action, therefore, soluble salts are to be recommended (5).

IODIDES IN THE TREATMENT OF SYPHILIS.

The iodides do not apparently affect the organism of syphilis, and for that reason should not be regarded in any sense as a substitute for mercury or salvarsan. Their function is that of promoting lysis and absorption of granulomatous and newly formed fibrous tissue, whose development is one of the pathological changes induced by the presence of the *Spirochæta pallida* in the body. The administration of iodides may in general be begun in the early secondary stage of syphilis in order to combat the fibroses from the very beginning. In order to prevent meningeal irritation and neuro-recurrences, Pinkus recommends large doses of potassium iodide in secondary syphilis, accompanied by involvement of the central nervous system. The most striking results are apparent, however, in the treatment of gummatous infiltration and have no place in this paper. It should invariably be administered in conjunction with mercury, whose germicidal action upon isolated spirochaetes is aided by the breaking down and absorption of infiltrates.

SALVARSAN.

Several preparations with essentially the same base are now in use; old salvarsan or arsphenamine, neosalvarsan or neoarsphenamine, sodium salvarsan, and silver salvarsan. Of the relative values of salvarsan and neosalvarsan much has been written and each has its champions. According to the results of experimental studies of Schamberg, Kolmer, and Raiziss, 0.6 gram arsphenamine equals 1.05 grams of neoarsphenamine in therapeutic activity, and they consider 1 gram of neoarsphenamine to have a greater margin of safety than 0.6 gram arsphenamine, although the latter has a trypanocidal activity 1.74 times greater than neoarsphenamine (6). Much work has been done recently with the latest preparation, silver salvarsan. It is reported less toxic, is used in smaller dosage, and is more soluble than the older salvarsan, and is seemingly as effective, but the few cases of argyria that have been reported following its use have led most men to be skeptical of it.

When salvarsan was first introduced injections of the neutralized drug were made subcutaneously, but the frequent occurrence of sloughs and the painfulness of this method led to its being abandoned. Deep intramuscular administration was then substituted and it still has occasional advocates, such as Wechselmann, Eicke, and Sutton. On the whole, however, both experimentally and practically, the intramuscular injection has proven to be less satisfactory than the intravenous.

In general, the average adult subject should receive no more than 0.3 gram of old or of neosalvarsan at the first injection. One week between injections is the usually accepted interval, although Sicard, Pollitzer, Ormsby, and others shorten this interval even to one day, and Neisser insists on 10 days between the larger doses. The average dose of salvarsan after the second or third is, according to Fordyce, Wechselmann, Tomasczewski, and Neisser, between 0.2 and 0.5 gram. Gennerich employs somewhat larger doses. Kromeyer thinks the single dose of salvarsan should not exceed 0.4 gram. Leredde, who believes salvarsan capable of curing syphilis without the use of mercury, employs doses of neosalvarsan as large as 1.2 grams at the end of a course. Dreyfus urges high total dosage amounting to even 5 or 6 grams in a period of six to eight weeks. Such large dosage is, however, losing instead of gaining favor. The general practice now among conservative workers is to use 2 to 3 decigrams for the initial dose with 4 and at a maximum 6 decigrams for subsequent weekly doses (4).

THE ABORTIVE TREATMENT IN EARLY SYPHILIS.

The possibilities of aborting a syphilitic infection is a conspicuous therapeutic advance which we owe to salvarsan. Many cases after a

thorough course of abortive treatment fail to evidence the slightest sign of the disease after the most searching clinical and serological investigations. The strongest evidence in the favor of the possibility of an abortive cure is the fact now often observed of reinfection.

A certain percentage of the cases of reinfection undoubtedly represent local recurrences, and another group may perhaps be interpreted as superinfections. The literature now contains many reported cases of evidently bona fide reinfections by such men as Hoffmann, White (28 cases), Spangenthal, Goubeau, Levin, Kermorgant, Klauder, and many others. Reported cases should fulfill the following requirements: The *Spirochæta pallida* should have been found in both attacks, with a positive Wassermann reaction during the first infection and a negative reaction early during the second. Jacobi, in an article on reinfection and curability of syphilis, states that the question "Is syphilis curable?" can not be answered definitely in the light of our present knowledge, the occurrence of reinfection in syphilis must be accepted as an established fact, and that reinfection is by no means evidence of curability (7).

The first essential to an attempt at abortive cure is a prompt diagnosis of the primary lesion. Wherever syphilis can be recognized in the primary stage by the demonstration of the *Spirochæta pallida*, abortive cure should be attempted. The prospects of success are brightest when the Wassermann reaction is still negative, so that not a day must be lost in instituting treatment. Levy-Bing and Gerbay (8) discovered that the Bordet-Wassermann reaction appeared always after a certain interval following infection. If abortive treatment is pushed before this interval has terminated, it has every prospect of success, but after the expiration of this period treatment may retard the appearance of a positive Wassermann reaction but does not prevent its becoming positive sooner or later. This interval is 37 days in length. It is followed by a period of 8 days, in which the outcome is dubious; after the forty-fifth day no treatment will ward off a positive reaction. Hence they conclude that effective abortive treatment can not be expected after the thirty-seventh day.

Abortive treatment should not be undertaken in individuals in whom the use of arsphenamine or the most intensive employment of mercury is contraindicated. An examination of the urine, blood pressure, and cardiovascular system should invariably precede the first injection.

The technique of abortive treatment as employed by clinicians of large experience varies noticeably. Most of these workers now employ courses of treatment over a longer period than that which they formerly considered sufficient and believe it is a better policy to err on the side of over rather than of under treatment. A few of the

systems used by these various workers will be considered in this paper. Those in use for abortive cure and in the treatment of early syphilis are essentially the same. As we have no criterion for absolute cure except time, and as the best results are obtained by early treatment, most syphilographers are recommending repeated courses of treatment given frequently early in the disease. It is also well to recognize the value of Gennerich's postulate and restrict the rest interval to six weeks or less in order to prevent a Wassermann relapse.

Neisser (9) and Wechselmann (10) announced their systems of treatment in 1913. Neisser used two courses of combined salvarsan and mercury, and Wechselmann depended on neosalvarsan alone, giving 11 injections in 10 weeks. Hoffman (11), Leredde (12), and Gennerich (13) announced their systems in 1914. Hoffman employed five injections of salvarsan, followed by a course of mercurial inunctions. Leredde used neosalvarsan alone in doses from 0.15 to 1.2 grams, employing three courses with a three-week rest interval. Gennerich differentiated between early cases with negative and with positive Wassermann reactions, using one course of salvarsan combined with mercury in the former, and two courses in the latter. In later cases treatment consists of three courses or more, depending upon the serological findings.

Fordyce recommends giving a course of 5 to 6 injections at intervals of one to two weeks in average doses of 0.4 gram, together with 20 to 30 injections of a soluble salt of mercury at one to two day intervals, or 12 injections of an insoluble salt at weekly intervals. Two such courses are usually given. He emphasizes that the first course is probably the all important one (14).

The treatment recommended for the French Army in 1916 was designed to render the soldier fit to return to his unit as quickly as possible, and plans to complete his cure after his return to duty. To this end eight intravenous injections of neoarsphenamine are administered in increasing doses at intervals of six days, the patient being in a hospital. In addition to this 42 injections of a soluble mercurial salt or 50 inunctions are administered. At the end of this course, which lasts seven weeks, the patient returns to duty, and one month later commences protoiodide of mercury pills by mouth, taking them during the first 10 days of each month for a year (15).

The minimum course prescribed in 1917 by L. W. Harrison at the military hospital, Rochester Row, London, for average early cases of syphilis in the British Army is as follows: Three doses of 0.3 gram of salvarsan on the first, fourth, and eighth day; 0.4 gram on the twenty-second; 0.5 gram on the twenty-ninth, forty-third, and fiftieth days; and eight injections of mercurial cream at weekly intervals. On the fifty-second day a Wassermann test is made, and

if it is not completely negative, potassium iodide is given for two weeks, followed by a course of three weekly injections of salvarsan of 0.3, 0.4, 0.5 gram, respectively, and three injections of mercurial cream. If the blood is still positive, a series of short courses is prescribed similar to the last three injections of the first course. He states that it would probably be better to give a complete course even if the case were negative on the fifty-second day (15).

A system of standard treatment for syphilis was devised by Young for the American Expeditionary Forces, and is a very commendable one. It comprises as a minimum four courses of treatment in a little over one year. The first course consists of eight injections of neoarsphenamine in graded dosage from 0.3 to 0.9 gram. The first three injections are given at four-day intervals and the rest at weekly intervals. A soluble salt (cyanide of mercury) is employed at the start, and then the insoluble gray oil is substituted. The first course is followed by a 30-day rest interval, at the end of which a Wassermann reaction on the blood and a complete serological examination of the spinal fluid is made. Regardless of serological results, a second course, which consists of five weekly injections of neoarsphenamine in graded dosage from 0.45 to 0.9 gram, combined with five injections of gray oil, is instituted. Two more courses are given, regardless of the Wassermann reports, at a 10-week and a 3-month interval. Following the fourth course a four-month rest interval is allowed, and if the blood Wassermann and spinal fluid are then serologically negative, no further treatment is given, but the patient is checked up serologically and clinically at the end of a four or five month rest period (16).

In his book on Syphilis, Hazen advises eight injections of arsphenamine, the first four injections at three to five day intervals and the last four injections at weekly intervals accompanied by a course of mercury. A second course of four arsphenamine injections followed by another course of mercury is given (17).

Habermann and Sinn believe that patients who have passed the negative phase of primary syphilis are best treated by two or three courses of arsphenamine and mercury. A single course, even if the Wassermann reaction becomes negative, is not sufficient, and the patient is not entirely cured, as proven by the occurrence of relapse syndromes. A course consists of from 8 to 10 injections of neoarsphenamine beginning with 0.3 gram and ascending to 0.6 gram at intervals of five to seven days. Mercurial injections are used in combination with the above course. A period of from six to eight weeks constitutes the rest interval (18).

Finger advocates in primary syphilis prior to the Wassermann positive period treatment consisting of 30 inunctions and 5 to 6

moderate doses of salvarsan. Once the Wassermann reaction is positive, even if no secondary symptoms are apparent, the case is considered as one of secondary syphilis, and treatment consists of repeated courses of arsphenamine and mercury at intervals of three or, at the most, four months (19).

Leven protests against the dogmatic statement that cases of seronegative primary syphilis can be aborted by a single course of treatment and cites cases to prove his point (20).

Pollitzer employs a system of treatment based on the principles of intermittent sterilization and prolonged saturation. His course of arsphenamine consists of an intravenous injection of a full dose (0.1 gram for each 25 pounds body weight) of arsphenamine on each of three successive days. His course of combined treatment consists of a course of arsphenamine followed by a four to six week course of mercury by injection. Four courses of combined treatment should be given during the first year after infection, irrespective of the Wassermann reaction, having six and eight weeks' rest interval, respectively, between courses. Further treatment in early cases is called for or not according to the results in the individual case (21). It will be noticed that this system is slightly more prolonged than as originally announced in 1916.

In the early stage before generalization has occurred Ormsby recommends three injections of arsphenamine, given on alternate days.' The average dose is 0.4 gram. The first dose is never more than 0.2 gram. Following this course, treatment with mercury either by injection or inunction is given for one month. Six weeks from the last arsphenamine injection three more injections are given. After the second series of arsphenamine injections, mercury is employed for three months, followed by a third series of arsphenamine, and mercury again for three months. In the second year two series of treatment are given in Wassermann negative cases as a prophylactic. In Wassermann positive cases the procedure is as outlined in the first year (22).

The system of treating early syphilis in use by Stokes at the Mayo Clinic, with whom the writer has had the opportunity of being associated as an acting fellow during the past four months, probably covers a longer period of time, with more elaborate checks on the patient's condition, than any of the methods outlined. The results are in the process of compilation. The result in regard to the reversal of the Wassermann reaction is at least as good as any that has been published, and there have been no neuro-recurrences in early cases noted. The system consists essentially of arsphenamine administered in four courses of 8, 6, and 6 injections, respectively, having an initial dosage of 0.3 gram and a final dosage of 0.4 to 0.5

gram, with an interval between the courses which should not exceed six weeks; and mercury administered in three courses of 80 inunctions each during the first year, which are given so as to overlap the arsphenamine administered until the third course is begun. Not less than 300 inunctions of 4 grams of mercury should be given during the entire treatment. If specially indicated, an examination of the cerebrospinal fluid is made at the time of the second and sixth injection of each course, otherwise the examination is made as routine with the second injection only. At the completion of the treatment the patient is directed to return for observation at the end of 42 weeks, after which time he is to return at intervals of from four to six or eight months for four and one-half years, and yearly thereafter for a decade or longer as determined by conditions and circumstances.

CONCLUSIONS.

Over four centuries in the treatment of syphilis with mercury failed to develop any satisfactory standard of treatment. More than 10 years' experience in modern methods of treatment have likewise failed to bring us much nearer this goal. But advances have been made in this direction. At least the use of arsenicals and mercurials in association, with few exceptions, comprise the basis of modern systems of treatment. Time and observation of treated cases only will determine the mode of application, dosage, number of courses, and the length of periods of rest best applicable for cure.

It is recognized that many syphilographers refrain from announcing a system of treatment, realizing that more is necessary than the simple 1-2-3 steps of system in piloting a given case to cure. It requires a thorough knowledge of the disease, a technical and therapeutic knowledge of methods of treatment, and the handling of complications that can not be incorporated in a simple standard of treatment. Yet the writer strongly favors the adoption of some standard of treatment, at least for early cases of syphilis, in the United States Navy. There are several reasons for the adoption of such a standard.

The service would benefit in the establishment of a standard for treatment whereby cases could be checked up and followed through a set course of treatment, barring complications, with less danger to the patient and more promise of cure, than where various standards are followed in the same case.

More satisfaction among our patients would be produced by a standard treatment, and a better spirit of cooperation would be secured if they were not given various treatments according to the special leanings of different medical officers.

Our records would be unified so that statistics could be compiled on a large number of treated and observed cases that would be, in

future years, of the utmost value in determining the value of such a standard and of present methods of treatment.

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A FIELD HOSPITAL OF THE UNITED STATES MARINE CORPS.

By G. F. Cottle, Lieutenant Commander, Medical Corps, United States Navy.

The Marine Corps, having grown in size and having been called upon for more extensive operations ashore in the last few years than heretofore, presents to the Medical Department of the Navy a more complicated medical problem each year. What a few years ago was considered a luxury, to-day has become a necessity. The type of recruit is changing, he stays in the Marine Corps a shorter time than of old. His people at home follow his military career with a greater interest; they think more of his comfort; they expect more of the officers who care for and lead him; they expect him to be given medical and surgical treatment fully up to the standard of the best that the medical profession has developed whether the man is serving at home or abroad, at sea or on shore.

Station C

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FIELD HOSPITAL

FOURTH REGIMENT U.S.M.C.

SANTIAGO, D.R.

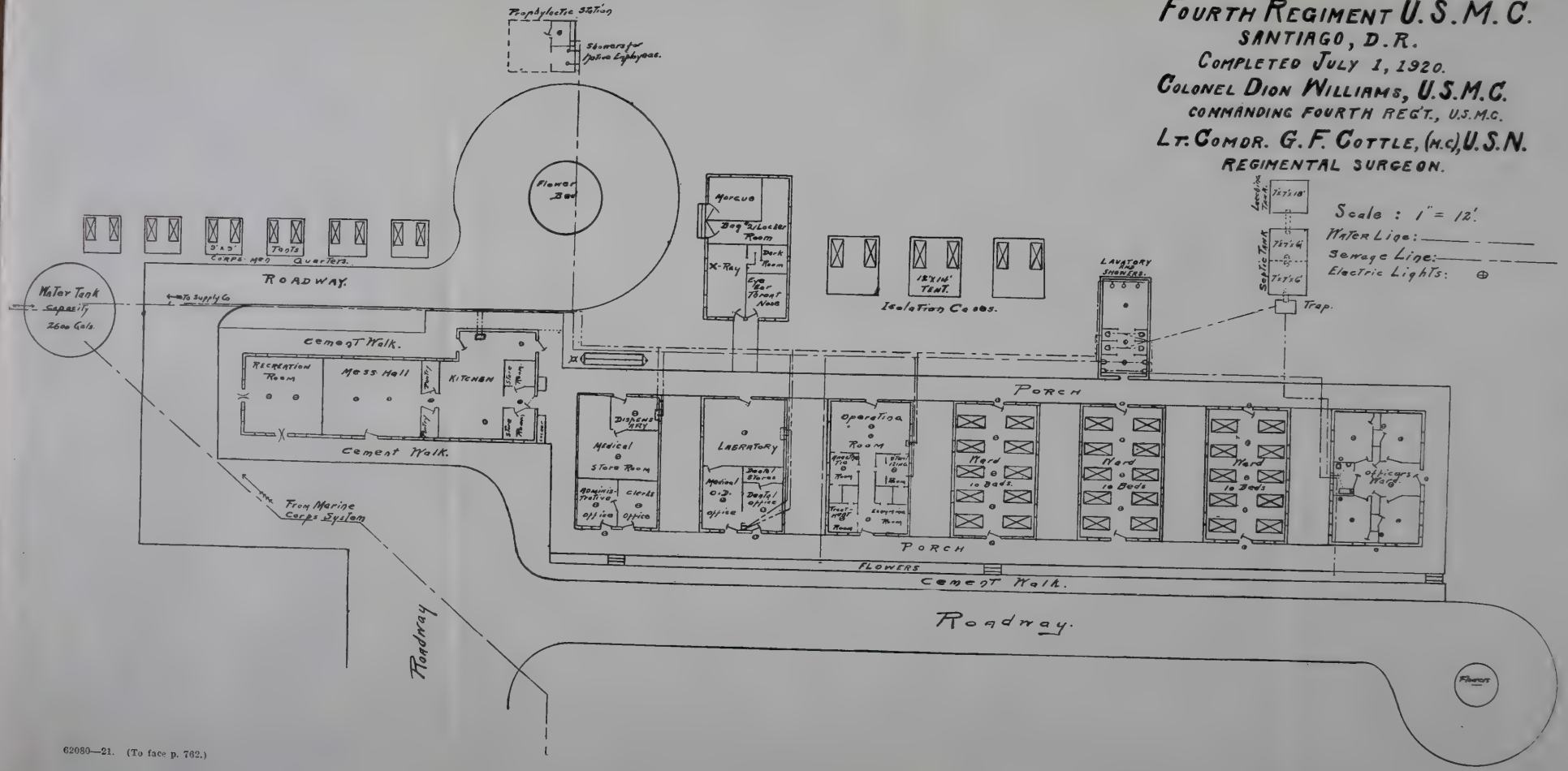
COMPLETED JULY 1, 1920.

COLONEL DION WILLIAMS, U.S.M.C.

COMMANDING FOURTH REG'T., U.S.M.C.

LT. COMDR. G.F. COTTLE, (M.C.), U.S.N.

REGIMENTAL SURGEON.



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Some years ago the Bureau of Medicine and Surgery prepared a special supply table known as the field supply table, based on the experience gained by medical officers who had served with the United States Marine Corps on expeditionary duty. For a mobile force landed from a fleet with the medical facilities of the various ships of the fleet at hand, and with perhaps a hospital ship as a medical base, the field supply table adequately meets the medical needs of the landing forces.

In the northern district of the Dominican Republic during the period of active military penetration of the forces of the United States Marine Corps and for some time after settling into the present less mobile stage of temporary occupation, the regimental medical and surgical equipment and the field supply table met the requirements of the regimental medical officers. As the status of occupation became more fixed, and especially after the supporting fleet and the hospital ship had retired from the scene of activities, the medical department of the Fourth Regiment of Marines found itself separated from naval hospital facilities by many days of arduous travel over land and sea. Gradually it was found that equipment and buildings and a more liberal allowance of medical supplies would be necessary.

In July, 1919, the necessity for better facilities for caring for the sick was brought to the attention of the Bureau of Medicine and Surgery and to the Major General Commandant of the Marine Corps by the regimental surgeon and the commanding officer of the regiment. The Bureau of Medicine and Surgery liberally met all requests for medical supplies in excess of the allowance on the field supply table, and furnished six portable buildings with which construction of a field hospital might be begun. The Major General Commandant authorized the commanding officer of the regiment to proceed with the construction of a field hospital suited to the needs of the regiment in its then semipermanent status of occupation. Many times it has been necessary for a medical officer serving on expeditionary duty to take over a school, church, stable, hotel, bakeshop, or whatever building happened to be available for remodeling and adaptation to his needs as shelter for patients, his assistants, and equipment. The construction of the Fourth Regiment Field Hospital is a new and possibly a forward step in the endeavor of the Marine Corps to provide a proper up-to-date and adequate environment for its sick and its medical personnel on expeditionary duty. This is the first time that a field hospital has been planned and constructed from the ground up for a regiment of marines, and it is thought that a description of this structure might be of interest to medical officers other than those who have had a share in the planning, construction, equipment, and management of this hospital.

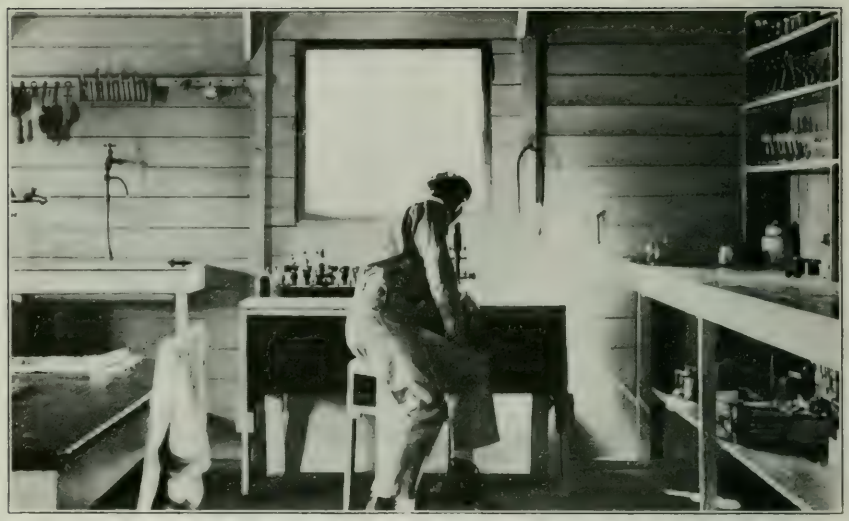
The site selected is convenient for the regiment, which is scattered in small detachments throughout the Northern Department of the Dominican Republic. On the outskirts of the city of Santiago, located on a ridge overlooking the city and the beautiful surrounding hills, valleys, and plains, it is exposed to the unobstructed stream of the prevailing breeze. Its natural drainage is perfect; rain water can not stand anywhere near. Convenient to the camp of the regimental supply company, the carpenter shop, corral, garage, and other units of the quartermaster department and pay office, it is nevertheless sufficiently isolated from them to be a safe place for the care of communicable diseases. The city water supply and electric lights are accessible. A deep ravine back of the immediate site and a wide uninhabited area on three sides provides for a real degree of isolation. One road, and that directly within view of the administration office, permits the entrance of patients to the hospital; a branch road exists for officer patients and another branch for the receipt and delivery of stores.

The general plan of the hospital is adapted to the warm climate; a group of separate buildings, 10 in all, joined together and surrounded by a 6-foot covered porch or veranda. Beneath the buildings an air space is provided by their elevation upon cement blocks. The walls are of tongue and groove lumber, clap-boarded, and painted light gray inside and forest green outside. The floors are of wood everywhere except in the kitchen and mess hall, operating pavilion, and bathhouse, where cement has been used. Excellent natural ventilation and light is provided by windows and openings under the eaves. The wards, galley, mess hall, and operating rooms are well screened against mosquitoes and flies. Tents provide for the segregation and, when necessary, the isolation of contagious cases, and in tents the hospital corpsmen are quartered. Long connecting porches provide shade and a clean place outdoors for convalescent patients, and make it unnecessary to utilize space within the buildings for hallways and passages.

The value of the refreshing and almost continuous breeze, blowing most of the year from one direction, was considered in the design of the hospital, and the buildings were placed in relation to one another, and their interior arrangements so planned as to take advantage of this beneficial factor of the location. The disinfecting influence of the tropical sun was also considered, and yet a proper shade for the sick and their attendants is provided. The plumbing is excellent, modern in every respect, bathrooms, toilets, and sinks being of the best type and well installed, yet the fixtures are much less expensive in type than those furnished in the more permanently constructed naval hospital. Kitchen effluent is led into an adjacent

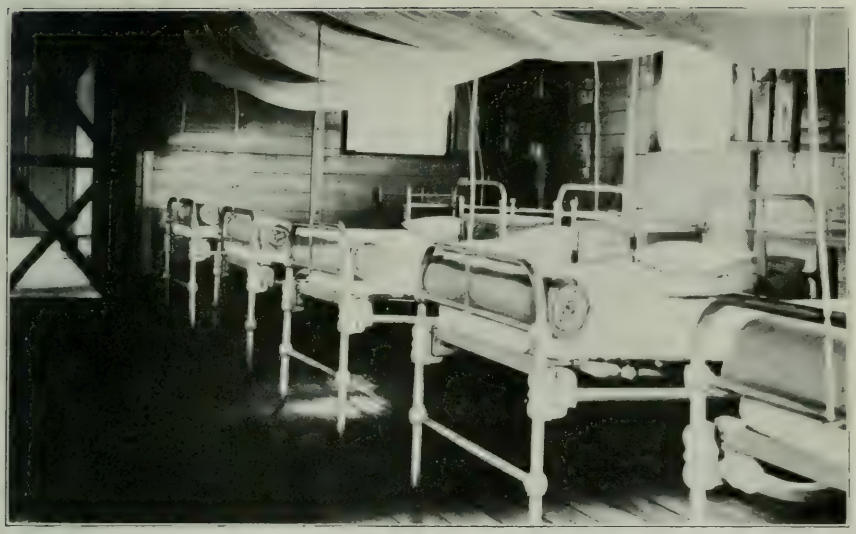
VIEW OF WARDS.

HOSPITAL CORPS QUARTERS

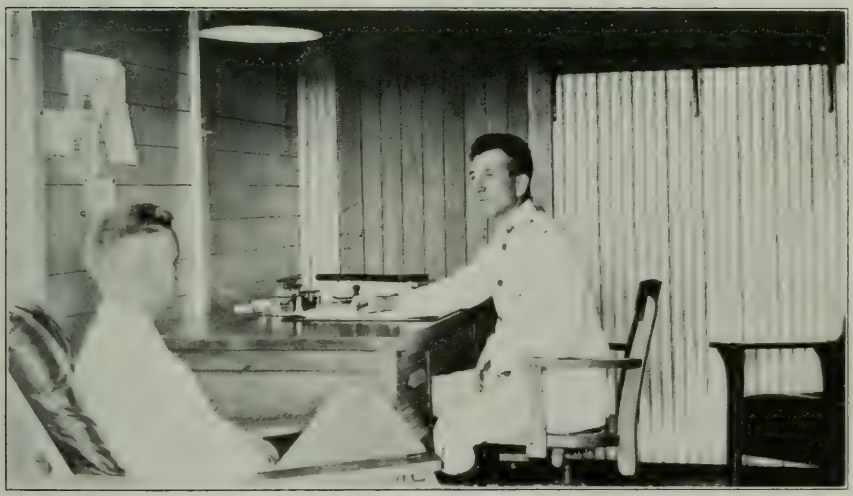


LABORATORY.

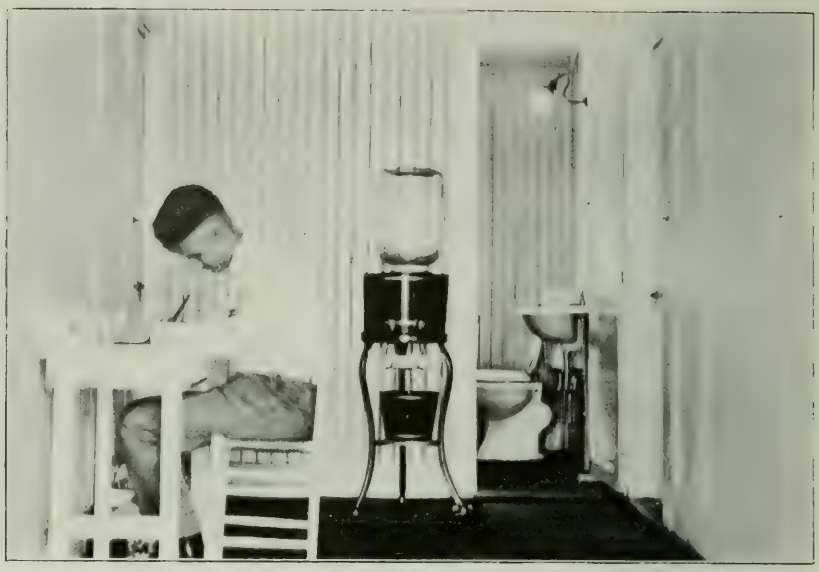
OPERATING ROOM.



INTERIOR OF WARD.

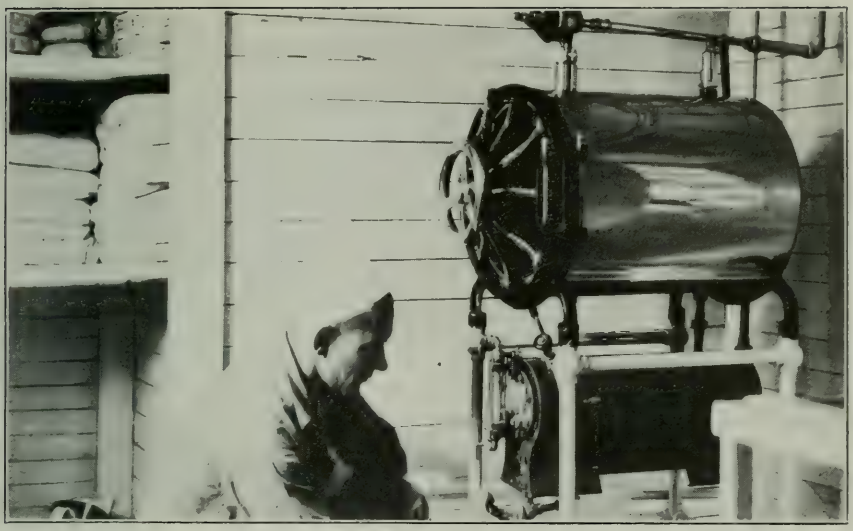


MEDICAL OFFICER'S OFFICE.

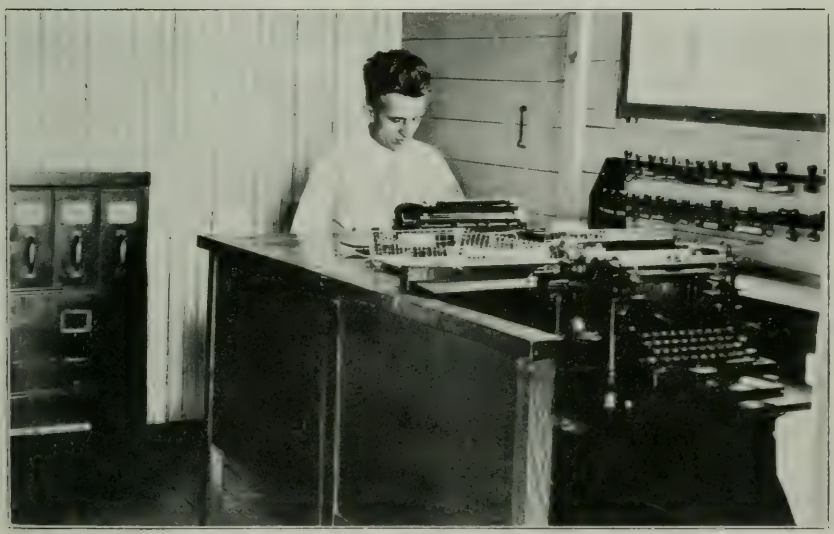


SICK OFFICER'S QUARTERS.

SICK OFFICER'S ROOM.

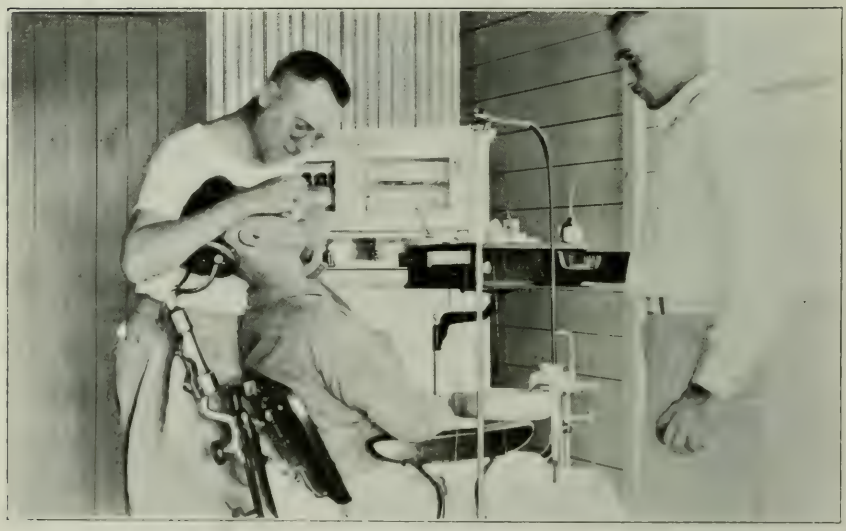


STERILIZING ROOM.



HOSPITAL OFFICE.

DISPENSARY.



DENTAL OFFICE.

ravine in an open gutter, where the sun, the rains, and seepage into the soil provide for its ultimate disposal. All other drainage except that for storm water is carried through iron pipes with adequate traps into a closed anerobic, two-chamber, cement septic tank, thence through a sand filter into the open ravine.

The administration office is placed where it has visual control over all persons entering or leaving the hospital. The commissary rooms and the kitchen are cool and well planned, and the cleanliness and comfort of the civil employees have been provided for by a shower bath for them alone. There is an excellent storeroom for commissary and quartermaster stores. Separate lockers for clean linen, dirty linen, closets for stowage of articles in daily use, book shelves, shelving for bottles and other apparatus, and many other conveniences have been built in wherever needed, so that there is a place for everything and orderliness and cleanliness are thereby easily maintained.

The medical storeroom, contiguous to the administration office and dispensary, is large enough to accommodate all the medical supplies listed on Form B in quantity sufficient to meet the requirements of the hospital and the sick bays of isolated detachments. In fact it of necessity acts as a miniature supply depot and must carry in stock an excess because a long time, often months, may elapse between the placing of a requisition and the receipt of the supplies from the United States, due to the distance, infrequency of direct Government transportation between New York and the Dominican Republic, and the other unavoidable delays. The storeroom is so arranged that all supplies are accessible both to sight and hand and arranged in the sequence of Form B for convenience in taking inventory. The dispensary is small and is so arranged as to contain only the equipment used in actual dispensing.

The office of the dental surgeon is small yet sufficient to contain the standard Navy dental equipment properly arranged for operation. A closet, which contains the dental officer's supplies, opens into the office, thus giving him complete control over his own supplies.

The office of the medical officer is next to the laboratory, so that he has the conveniences for accuracy in his diagnostic work right at hand. The laboratory is large, airy, light, and comfortable, well adapted to house the portable laboratory equipment standardized during the war for field work, and on the shelves there is ample room for additional supplies that are kept on hand to fill requests for laboratory supplies when made by the seven outlying sick bays of the regiment, each of which has its own microscope and accessory case. Back of the laboratory is a guinea pig hutch and run. A building shown on the plan, and now about to be constructed, is to house the X-ray apparatus, to provide space for plate developing; space for

an eye, ear, nose, and throat diagnostic and operating room; space for a bag and clothing locker and for a morgue.

The operating pavilion has a room for the treatment of acute venereal cases, a room for "pus" dressings, a surgeon's dressing room, a sterilizing room, and the operating room proper.

The three wards for patients, of 10 beds each, are cool, shaded, yet with sufficient light, and the adjacent porches with the comfortable chairs, reduce the stay of convalescent patients indoors, thereby giving the bed patients the quiet and room they need.

Three Munsen-type hospital tents provide six beds for the segregation of communicable diseases.

Back of the central ward is the building containing baths and toilets, which is ample in size and so constructed as to be easily kept clean and dry.

A recreation room is provided with a pool table and a phonograph, accessible to the convalescent patients or the hospital corpsmen during leisure hours, yet far enough removed from the wards.

The sick officers' quarters, with its four rooms for officers and its own bathroom and toilet, all planned in detail by the commanding officer of the regiment, furnished with every need by the Bureau of Medicine and Surgery and with every luxury and additional comfort by the ladies of the regiment, is a concrete example of the support which a medical officer receives when a real and active interest in the welfare of the sick is taken by the entire regiment.

No laundry and disinfection building has been provided, because the native washerwomen prefer to use the nearby river.

The entire structure has stood the test of nearly a year's use and has proved that the relative proportions of space allotted to the various units are correct. The tables of floor space appended, the ground plan, and the pictures of the building as a whole and of the interior will serve to make the foregoing general description clear.

In the construction and equipment of this field hospital several special aims have been met, among which may be mentioned:

(*a*) The completeness of the unit because of the detachment from medical bases and because of the military necessity of independence and self-efficiency when on occupied foreign soil.

(*b*) The semiportability of the entire unit. Slight changes in the method of construction could improve this feature should another such structure for another regiment similarly situated with a similar mission be planned or contemplated, such as porches and partitions, built in sections, the elimination of cement floors, etc.

(*c*) The ability to rapidly and easily expand to meet the needs of a brigade or of serious extensive epidemic. The normal capacity, 40 beds, could readily be increased to perhaps a total of 300 beds for patients by the addition of tents and medical personnel.

The construction of this hospital has sharply emphasized in the mind of the writer a difference between the Marine Corps and the Navy administrations which must ever be kept in mind by medical officers serving with the Marine Corps on expeditionary duty. In the Navy the environment in which the Bureau of Medicine and Surgery places its medical personnel and supplies is planned in detail by the Bureau of Yards and Docks for naval hospitals and for sick bays in navy yards and naval stations, and by the Bureau of Construction and Repair for hospital ships and for the sick bays of naval vessels. Prior to construction there is cooperation and direct consultation between these bureaus and the Bureau of Medicine and Surgery so that the planning of the architectural features and the permanent fixtures follows, so far as possible, standard designs and benefits by the past experience of these bureaus in planning a proper utilization of space and of the funds allotted. In the Marine Corps on expeditionary duty the Major General Commandant delegates to the commanding officer and the quartermaster of the different units the planning and construction of the temporary and semipermanent structures that are needed by the units.

This difference in method has the advantage of placing the medical officer serving with a marine expeditionary force in direct contact with the constructing and planning officers, but it has the disadvantage of losing for him and for them the supervision and guidance of his own bureau in the formulation of medical plans, for these officers do not of necessity consult the Bureau of Medicine and Surgery prior to construction nor have they any standard plan prepared or approved by the Bureau of Medicine and Surgery which may be consulted or referred to as a guide.

Commanding officers vary in their views of what constitutes a proper environment for the Medical Department; they vary in their ability to formulate such plans in detail, and they vary in their ability to function as architects and builders. Medical officers differ in their experience in planning a proper medical environment for the sick without the guidance of the Bureau of Medicine and Surgery. The result is a lack of standard design in different regiments, a tendency to meet the urgent needs with what may later prove to be inadequate or incomplete construction. Because of these unavoidable differences in ability and experience, it is believed that specifications of materials needed and a standard plan for medical buildings for the use of the Marine Corps, regiment and brigade, on expeditionary duty, should be prepared for the Major General Commandant by the Bureau of Medicine and Surgery in collaboration with architectural designers of the Bureau of Yards and Docks, so that these specifications and plans could be consulted and referred to by commanding officers and medical officers who, together, face the prob-

lems of construction or alteration to meet the medical needs of the marine expeditionary forces.

The degree of success which has attended the planning and construction of the field hospital of the Fourth Regiment must be ascribed to the planning and construction ability of Colonel Dion Williams, United States Marine Corps, who in addition to his other more purely military duties has given a great deal of time and effort to the completion of this project. Another regimental commanding officer, facing a similar problem, should not be obliged to struggle with the same absence of a standard plan and specifications of material needed for construction.

In a consideration of the problems with which the commanding officer of the regiment and his quartermaster were confronted when instructed to build this field hospital it may be of interest to state that while the Bureau of Medicine and Surgery furnished six (20 by 32) portable buildings and three special type sinks (operating room, laboratory, and venereal treatment room), the regiment furnished a great deal more than this to build this hospital.

Among materials furnished by the regiment may be mentioned: Four complete buildings; nine tents and tent flooring; 24,000 feet of lumber for porches, partitions, shelves, counters, etc., and all hardware required for their erection; 450 gallons of paint, green, gray, red, and white; 900 sheets of galvanized-iron roofing 2½ by 8 feet; 320 barrels of cement, with the necessary sand and gravel for 400 cubic yards of cement work in 1,000 square yards of cement walks, 1,872 square feet of cement floor for cement piers, the septic tank, plumbing traps, etc., and for 225 square yards of roadway contiguous to hospital.

It furnished five water flush closets, four square sinks, six hand sinks, one bathtub, and four showers, all with the necessary fittings, and 2,500 feet of electric light wire, with the necessary fixtures, bulbs, switches, etc.

In addition to the material the regiment furnished the architect, the builder, the carpenters, plumbers, masons, electricians, painters, and the road builders, laborers, and all transportation.

TABLE No. 1.—*Floor areas of buildings and tents.*

	Square feet.
6 wall tents	540
3 hospital tents	618
6 portable buildings:	
Office, dispensary, and medical storeroom	640
Offices and laboratory	640
Operating pavilion	640
Ward No. 1	640
Ward No. 2	640
Ward No. 3	640

TABLE No. 1.—*Floor areas of buildings and tents*—Continued.

	Square feet.
1 sick officers' quarters	800
1 bathhouse	324
1 special building	700
Miscellaneous:	
Linen locker	22
Employees' bath	64
Prophylactic head	64
Guinea pig hutch	24
Porches, covered	2,940
Total	9,936

TABLE No. 2.—*Floor areas occupied.*

	Number of beds.	Square feet.	Percentage of floor areas occupied, not including porches.
(*a*) Beds for patients:			
Enlisted men—			
Ward No. 1	10	640	7.68
Ward No. 2	10	640	7.68
Ward No. 3	10	640	7.68
3 isolation tents	6	618	7.34
4 officers' rooms	4	576	6.84
(*b*) Beds for hospital corpsmen, 6 wall tents	12	540	6.42
(*c*) Baths and toilets:			
Enlisted men, patients, and hospital corpsmen	.....	324	3.85
Officers	.....	64	0.76
Civil employees	.....	64	0.76
(*d*) Recreation room	.....	233	2.77
(*e*) Diagnosis and special treatment:			
Operating pavilion	.....	640	7.68
Medical, dental, and laboratory	.....	640	7.68
X-ray; eye, ear, nose, and throat; morgue	.....	504	5.99
(*f*) Administration	.....	240	2.88
(*g*) Laundry and disinfection	.....	.....	.....
(*h*) Storerooms	.....	915	10.87
Medical and dispensary	.....	400	.....
Linen, clean and dirty	.....	22	.....
Bag and clothing locker	.....	196	.....
Sick officers' closets	.....	24	.....
Commissaries and quartersmasters	.....	181	.....
Mess gear	.....	92	.....
(*i*) Kitchen, pantry, and mess hall	.....	908	10.79
(*j*) Miscellaneous	.....	224	2.66
Vestibule, sick officers' quarters	.....	136	.....
Venereal prophylactic head	.....	64	.....
Guinea pig hutch	.....	24	.....
Total	.....	9,549	.....

It is hoped that the success which nearly a year's use of this field hospital has demonstrated may prove a help in the formulation of standard plans and specifications for the construction of field hos-

pitals of a portable type for the other regiments, and that this article may be of interest to medical officers and that it may serve to emphasize the need for the preparation of specifications and plans, approved by the Bureau of Medicine and Surgery, which shall serve as a standard for the construction of buildings to house the medical department of a regiment or brigade when separation from naval bases and hospital ships becomes necessary.

TRAINING AND CARE OF THE FOOTBALL SQUAD AT THE UNITED STATES NAVAL ACADEMY DURING THE SEASON OF 1920.

By M. H. Roberts, Lieutenant, Medical Corps, United States Naval Reserve Force.

Proper care in the training and diet of men on a football squad will go far toward insuring a successful team. In order to accomplish this there must be the fullest cooperation between coaches, trainers, and the medical officer. It is probable that in the majority of cases it is the medical officer rather than the trainer or coach who fails in this very important fundamental accomplishment. He has a tendency to be dogmatic and often fails to recognize that he usually has intelligent persons to deal with who have had a far wider experience in this particular line of work than himself and who very often have valuable suggestions to offer. He should be constantly on the alert for these and gladly accept them.

On the other hand, particularly in the case of the injured, he should not be influenced by enthusiasm or the desire on the part of both patient and coach for a speedy return of the player to the game, but should be guided solely in his treatment by the pathology of the case in hand, never allowing the interest of the player, and therefore of the team, to become secondary to the desires of an enthusiastic and overzealous coach.

In handling a football squad as large as the one at the Naval Academy, it is impossible to give each man the close supervision necessary to obtain the physical perfection desired in each player. However, individual attention can be given to members of the "A" squad, numbering about 50 men.

Each man should be instructed to report at once to the medical officer any injury or feeling of ill health. Particularly should he be taught the evils of constipation and the simple hygienic remedies to combat it.

By close observation of the men on the field and in the dressing room it is possible to ascertain the condition of the players and to guard against overtraining or "staleness." The weight is a valuable index of the physical fitness of man and should be noted at least

three times a week and daily for men about whom there is any suspicion of overtraining. A steady decline in weight for three or four consecutive days during the latter part of the season is evidence of overwork and the necessity for rest. Generally one or two days' leisure is sufficient to restore most men to their former physical and mental fitness.

During the football season of 1920 it was necessary to carry out this treatment for only three men; however, there was noted among the fourth-class men who began training during the latter part of August, six weeks before the other members of the squad, a general slump in energy and activity toward the latter part of the season, which seemed to indicate that the period of vigorous training had been extended beyond proper limits.

A general massage of the entire body for about 10 minutes following practice is of value. It seems to rest the player and keep the muscles in excellent condition. Care should be taken in instructing the rubbers to warn them against too vigorous manipulation, for it must be remembered that the player has already had a strenuous workout and a massage of this character has practically the same physiological effect.

Players who on account of injury are unable to participate in practice, invariably should be instructed to report for massage each day, for only by this means can an injured man be kept in condition.

Long, hot showers following practice is weakening, and the players should be advised strongly against them. They should be instructed to spend the shortest possible time, compatible with cleanliness, under the hot shower and to follow it immediately by a cold shower for one minute.

The matter of diet is an extremely important point in the training of football men, and hence should be given considerable attention. At first glance, in feeding men who participate in such violent and long-continued exercise, the amount of food required seems remarkable. However, when we consider that it is not uncommon during a strenuous practice game for some of the larger men to lose as much as 8 or 10 pounds in weight, and the smaller men proportionately, it is evident that a relatively large quantity of food must be consumed to replace the waste and build up muscle tissue. Of course a large majority of this loss is water, still with the expenditure of so much energy there must be a great loss of stored-up food and tissue.

In arranging the menu at the Naval Academy in 1920 there were no radical departures from those of other years. Sugar was given more abundantly with no evidently deleterious effects. A more varied diet was provided than had been the custom and seemed beneficial. Either figs or prunes were served once daily along with some other

fruit, to which is partly attributed the very low incidence of constipation among the players.

On the football training table there were 88 men. The average daily consumption per man was 6,300 calories, obtained from 240 grams of protein, 300 grams of fat, and 660 grams of carbohydrate.

From observations during the past season it seems that the present arrangement of meals as served on the training table does not meet the requirements of the football squad. The routine heretofore has been to serve the heavy meal at 6.30 p. m., immediately after a hard practice, while at midday a comparatively light lunch is eaten. According to the laws of physiology this is not an ideal schedule. After two or three hours' hard practice a man is often exhausted, and to fill the stomach with a large amount of food is to invite indigestion. On several occasions the men have stated that they felt too tired to eat heartily.

It would seem much more desirable to serve dinner in the middle of the day, at least three hours before practice, except, of course, on the day of a game, when on account of the hour of the play this would be impossible and for other reasons would be undesirable.[1]

In consideration of the injuries resulting from football during the season of 1920, it will be of interest to know that the total number of men from which cases were drawn was 300, composing not only "A" and "B" squad men but also those participating in class football.

In the classification and enumeration of these injuries it was found that muscle contusion is by far the most numerous among the injuries treated. Next in number were sprains and contusions of joints, followed by fractures, dislocations, and muscle and tendon strains. Cases of chronic synovitis were rare, and there were only two players who suffered from teno-synovitis, in both instances the Achilles tendon being involved.

In the treatment of contusion of muscle the high-frequency current as delivered by a small portable machine was found to be a very valuable adjunct. It has the property of driving heat deep into the bruised muscle tissue which is a distinct advantage over the usual application of either moist or dry heat to the surface of the injured part. In addition to this property there is another very excellent modality furnished by this machine in the employment of the sinusoidal current for the production of complete muscular contraction. This method of producing contraction of the muscle is far superior to the use of the faradic current, in that the resulting contraction is more complete and is not accompanied by the disagreeable sensation

[1] Other authorities have found it more advantageous to serve the heavy meal of the day after exercise. Digestive disturbances did not follow this practice; while with a heavy meal in the middle of the day, the players lacked "pep," and many complained of nausea or actual vomiting after or during the football exercise.—EDITOR.

of an electric shock. This latter practice can not be indorsed too highly, as the favorable results obtained in the treatment of the majority of these injuries is attributed in a large measure to its use.

Not only is the use of this machine excellent in the treatment of a contused muscle, but it is found very efficient in delivering heat to an injured joint, particularly the smaller ones, and was almost invariably employed in the treatment of injuries of this character.

It is generally advised in the early treatment of muscle bruises to employ evaporating lotions and rest only, waiting 24 hours before the application of heat. This method was at first followed; later, however, the immediate employment of heat was tried with excellent results. The patient invariably stated that there was great relief, and it was evident that recovery was hastened.

The following was the routine carried out in the majority of the injuries of this character: For the first 24 hours the man was excused from all formations, drills, and athletics, but was allowed to attend his classes. It was practically never found necessary to put him to bed or even excuse him from classwork. As soon after the injury as possible, heat was applied either by means of the electric baker or steamed towels for a period of one hour, followed by the use of direct diathermy in as many cases as possible. During the first 24 hours, direct diathermy was twice employed for about one hour. On the second day this form of heat was again applied followed in most cases by the use of the sinusoidal current for 10 minutes. This produced complete contraction of the bruised muscle, and thus removed a great deal of the stiffness, increased circulation through the part, and softened the tense, hard muscle. The patient invariably noted great relief, and sometimes the improvement in function was remarkable. Occasionally a muscle was too severely bruised for the application of the sinusoidal current at the end of 24 hours and to these light pétrissage was administered with contraction probably on the following day.

After the contraction in those contusions of moderate severity a slight work out was permitted, possibly signal practice, but no scrimmage. The following day they would be ready for regular practice. However, for the next week or 10 days great care was taken that the injured part was well protected from possible injury; for a severe blow to an old contusion produces a condition much worse and much more resistant to treatment than was the first injury.

There were a few contusions much more resistant to treatment, but they were rare and almost invariably occurred among men who were not under the closest supervision or who were careless in reporting their injuries. They reported usually a week or more after their first injury, with a history of several subsequent blows over the same area. These cases showed plainly that not so much emphasis must

be placed on absolute rest to insure rapid recovery as on protection against further injury, which is absolutely essential. Of course, comparative rest for the first 24 hours is necessary, and occasionally 48 hours is required, but this was found to be rare.

In the treatment of these injuries it is absolutely essential to protect the injured player from the "husky rubber." A great deal of damage can be done to a bruised muscle by a vigorous massage given by the untrained "rubber" generally employed by football teams. The "rubber" should be instructed never to massage an injured player, no matter how slight the injury, until he has consulted the doctor in charge. Likewise the player should be warned against the possibility of this injury by insisting that he report all injuries immediately to the physician or trainer.

Injuries to the joints came next in number to those of the muscles, and those giving the most trouble were the knee, ankle, and acromioclavicular, the former leading the other two by a wide margin, not only in number but in resistance to treatment, and rendering the player useless for long periods of time.

Practically the only treatment of value in sprains and contusions of the knee is rest, daily application of heat as furnished by the electric bakers and the high-frequency current, and finally adhesive straps to support and protect the part. In this condition absolute rest is essential, it often being necessary to keep the patient at rest for a week or more, and occasionally hospital treatment is necessary.

Players giving a history of previous injuries to the knee were required to keep the joint supported and protected by means of adhesive or muslin support.

Sprains of the ankle were few and in most cases of slight severity due to the fact that every player on the squad, regardless of the condition of the ankle, was required to wear a figure-of-eight canvas bandage to support the joint. The player occasionally complained of this support at first, but he soon recognized the value of this preventive measure and never went out without it. This measure can not be emphasized too strongly; undoubtedly it saved many ankles from injury during the football season.

In the early treatment of sprains of the ankle, evaporating lotions were employed with a snug bandage. Absolute rest was necessary in most cases for the first few days. After the first 24 hours, heat was applied by means of the baker and the high-frequency machine; the latter is excellent for delivering heat to the joint. Finally an adhesive strap was applied after all swelling had subsided. The adhesive gave much better support if the vertical straps extended well up on the leg, almost a foot on each side, and were reenforced by a figure-of-eight canvas bandage so applied as to support those liga-

ments which had been strained or torn, which in most cases were the lateral ones.

A sprained ankle can not be protected and cared for too energeticallly. Usually it requires quite a long period of rest, and great caution must be exercised when the player begins using the injured part. It was found necessary to retain the adhesive straps for several weeks, and always thereafter the ankle must be well supported.

Injuries to the acromio-clavicular joint were frequent and very resistant to treatment, often keeping the man out of play for a week or more and were very prone to recurrence. Heat applied to the joint daily was of benefit. Restriction of the motion of the joint by means of a crossed adhesive strap during the first week gave relief and seemed to hasten recovery. In practically every case heavy padding over the joint was necessary for the remainder of the season, for even slight injury seemed to cause a recurrence of the trouble.

There were only seven fractures sustained by the entire squad during the 1920 season, the most interesting being one of the zygoma. Immediately after the injury there appeared to be a very marked deformity with impaction into the maxilla. However, the man recovered without operation and with very slight deformity. He was playing football again in six weeks and experienced no further trouble.

There was one fracture of the calcaneus, one of the tibia, one of the nasal bone, two of the metacarpals of the right hand and the terminal phalanx of the thumb. Only the first two of these injuries kept the men permanently out of the game.

In the treatment of teno-synovitis of Achilles' tendon rest in bed is absolutely essential. There were two cases of this trouble, and in one of them an attempt was made to keep the man up and about by means of plaster of Paris splints applied to the ankle. However, it was evident, after a day or two, that the condition was not improving, and that absolute rest was necessary. For five days he was kept in bed, during which time hot packs were applied daily to the tendons, and after crepitation had disappeared the parts were massaged. Exercise was begun slowly and by the end of the week the player was able to go through regular practice without discomfort.

GAS POISONING IN WARFARE.

By G. H. Mankin, Lieutenant, Medical Corps, United States Navy.

The subject of gas warfare is one which is of utmost importance to the Army and naturally, therefore, to the Marine Corps and to

any landing force of the Navy. Its importance in connection with warfare of a strictly naval character is, more or less, a matter of conjecture. An authentic instance of the use of poison gas as an offensive weapon in naval warfare is lacking. However, there are reports which indicate that such use was made by the Germans during the late war.

It is important that there should be a thorough appreciation of the part that gas has played in land warfare in order to properly estimate the possibilities of its use at sea. This is particularly necessary to combat the tendency toward undue apprehension that frequently attends the introduction of any new and novel method of offense. A proper, orderly, and well-balanced estimate of the applicability, probability of employment and suitability of gas for use in naval warfare can only be given after a careful study of gas warfare on land, the physical and chemical properties of toxic gases, and gas-warfare tactics together with their necessary modification to meet conditions at sea.

It is inconceivable that, in view of the tremendous value of gas as and offensive measure on land, there will be no attempt to apply it to future naval warfare.

It is a well-known fact that the first attack launched by the Germans against the Allies, April 22, 1915, had a tremendous moral effect upon not only those exposed to the cloud but also the rest of the world. That attack was of a low concentration of chlorine released from cylinders, and was not comparable to later attacks except in the effects produced. Improvements in container design and changes in tactics increased the concentration of the gas cloud and therefore its toxicity. Fortunately, defensive measures kept pace with the offense. It is doubtful if a single casualty would result if a regiment equipped with the latest and most modern antigas apparatus were exposed to a chlorine cloud gas attack of the concentration used in the first attack.

The first attack was delivered in the Ypres sector, between Langemarck and Hill 60, at the juncture of the Canadian and French colonial troops then in the line, and came as a complete surprise to the Allies. No protection whatever against this form of warfare had been provided. Those who did not fall back or attempt some simple protective measures, as breathing through water-soaked cloth, became casualties. There is no way of knowing the exact number of casualties, but C. G. Douglas,[1] writing in the Journal of the Royal Army Medical Corps, estimates that about 7,000 were affected, of whom 350 died, a mortality of 5 per cent.

[1] Douglas, C. G., Jour. R. A. M. C. XXXV, 80, July, 1920.

In the second attack, May, 1915, there were a smaller number of casualties, but a higher percentage of deaths. This may be ascribed to the fact that the concentration of chlorine gas was higher and the time of the attack was longer for the purpose of wearing down whatever protection had been provided. Wherever protection was defective or exhausted, due to long exposure to gas, the resulting casualty was severe.

Between December 19, 1915, and August 8, 1916, the Germans made five cloud or drift gas attacks against the British. They released large amounts of gas in a limited time, so as to attain the highest possible concentration. In addition, they increased the toxicity of the cloud by mixing phosgene with the chlorine. Phosgene (carbonyl chloride) is a lung irritant having, predominantly, the faculty of producing its effects late, and it does not call forth the spasmodic cough when breathed as does chlorine. For this reason, large amounts may be breathed without producing unusual symptoms which would ordinarily serve as a warning.

The casualties suffered from these attacks were as follows:

Total British cloud gas casualties	4,207
Total deaths	1,013
Relation of deaths to casualties, per cent	24

That there were not a larger number of casualties indicates a high standard of antigas discipline and a well-grounded knowledge of gas defensive measures. The average of 850 gas casualties in each attack can not be considered excessive when one takes into consideration the large number of men exposed.

The bulk of the casualties occurred in the front-line trenches, showing the large part played by the element of surprise. In one of the attacks, four battalions of one of the divisions actually holding the line, suffered 320 gas casualties and of these, 232 occurred at points varying from 50 to 500 yards from the enemy, 185 taking place in the fire trenches.

Of the 1,013 gas deaths occurring in the five attacks mentioned above, 485, or 47.8 per cent, occurred in the trenches; 175, or 17.3 per cent, occurred in the field ambulances; 320, or 31.6 per cent, occurred in casualty clearing stations; and 33, or 3.3 per cent, occurred in hospitals on the line of communications.

It will be noted that nearly one-half of the deaths occurred before the casualties could be admitted to any form of medical unit. Practically all of these casualties occur within the space of a few minutes. It is this fact that throws such a burden upon the medical department. In many of the attacks there was no period of rest following, because there was frequently an infantry attack after the gas had moved on. All of this increased the difficulties attendant upon transportation of the badly gassed.

Many deaths occurred in the early days due to the fact that the apparently lightly gassed were evacuated as ambulatory cases. Muscular exertion will accelerate the onset of pulmonary edema and aggravate the symptoms when edema has been established. It was on this account that very strict orders were issued to the British in France directing that all casualties caused by the lung irritant gases, except the known light ones, should be evacuated as stretcher cases.

The British experience, borne out by that of our own Army, indicates that deaths from chlorine or phosgene poisoning occur usually within 48 hours after exposure and that 80 per cent of them occur within 24 hours. It would seem, therefore, that all efforts should be made to get the patient to a place where intelligent, rational, and efficient treatment could be had in the first 12 hours. Treatment in a first-aid station or casualty clearing station must necessarily be of the most primitive type. However, the British attempted to provide oxygen for inhalations at the clearing stations, and they report very good results from this innovation.

After August, 1916, the Germans began to use the cloud gas attack less frequently, not at all against the British, a few against the French, and quite a number against the Russians. In one engagement two entire Siberian regiments, the Fifty-second and the Fifty-third, were wiped out. The partial abandonment of this form of gas attack may be ascribed to several facts. The gas cloud attacks have several disadvantages. Preparation for one entails a large amount of work, considerable time, immense amounts of material, and if the enemy carries out a successful raid and discovers what is intended, the work of days is lost. The cloud attack is wasteful, it is dangerous to one's own troops, and it is dependent upon the whims of the wind. A wind of too slow a velocity does not provide the necessary element of surprise, while a wind of too high a velocity does not allow the gas to remain over the object long enough to be effective.

To deliver a cloud-gas attack it is important to know the state of the gas preparedness and the gas discipline of the opposing troops. Efficient and effective gas defense can not be gained in a day; it requires long periods of training. The British found themselves, at one time, opposed by a German naval division, which had newly occupied a sector of the line in Flanders. This division was provided with poor respirators, poor system of gas alarms, and they were not trained in gas defense. It was decided to gas them as soon as possible. Accordingly the gas engineers occupied the trenches opposite the naval division. The Germans became suspicious and raided the trenches to get information. They found out what was planned, but could not hold the ground that they had gained. Imme-

diately they began an intensive course of training in gas defense. Although they had a week in which to accomplish this before there was a favorable wind for the attack, it turned out that they were not sufficiently trained, and it is reported that there were about 1,500 casualties out of a total of 6,000 men exposed to the gas, and there was a very high percentage of deaths.

The Germans used the cloud gas attack only where there was reasonable expectation of good results; for example, against poorly trained troops or troops that had only recently arrived on the lines. The American Army received a few attacks of this nature when they first arrived on the firing lines.

Very approximately, the concentration of the gas cloud is inversely proportional to the square of the distance between the two lines. This provides a considerable element of danger to the troops releasing the gas. Nearly always there is some one affected while working around the valves on the cylinders.

Weather conditions are important in all gas warfare, but especially so in the case of cloud gas. If a wind is too strong, the gas is dispersed; if too weak it moves the cloud over toward the enemy so slowly that there is no element of surprise, besides, a low velocity wind is notoriously changeable, and the results are often very disastrous to the attacking party. For example, the Germans attempted to gas a certain sector occupied by the British and the wind was of very low velocity. The gas rolled over the British trenches, the wind shifted and the gas rolled back over the German trenches and the Germans were seen moving many men out of the trenches the next day. Documents show that about 1,100 Germans were gassed through this shift in the wind.

Projector discharges caused results that were similar to those produced by cloud gas attacks. The British were impressed with the fact that the concentration in a gas cloud attack was greatest just in front of the trenches from which the gas is discharged. To obviate this defect, they used gas projectiles which were discharged from Stokes mortars. The amount of gas that could be sent over in this manner was truly remarkable. These mortars were able to deliver about 20 charges a minute.

Soon it became necessary to throw over larger amounts of gas in a very short time and the use of the Livens projector and canisters of gas fulfilled this need. A large number of these projectors were sunk into the ground at an angle of 45°. The range was varied by the size of the charge of black powder that was placed at the bottom. The canisters of drums contained phosgene usually and were exploded by contact fuse and booster charge. The discharge of these drums from the projectors was accomplished simultaneously by electricity, as is customary in blasting.

The concentration in the middle of a gas-projectile cloud may frequently be as much as 1 per cent.

Sixteen projector attacks were made against the British in the period between December, 1917, and May, 1918, with the following results:

Casualties	444
Deaths	81
Percentage of deaths	18.2

The British realized much better results than this in their use of the projector. In one attack there were 119 gas casualties with 53 deaths, in spite of the fact that the projector emplacement had been discovered and the troops warned.

After the first battle of the Somme, July, 1916, the Germans introduced shells containing such lung-irritant gases as phosgene, diphosgene and chlorpicrin. The points in favor of the use of gas shells are: (1) accuracy, (2) concentration, (3) surprise, (4) generally speaking, independence of air currents, wind velocity, and temperature.

Between July 15, 1916, and July 12, 1917, the number of casualties caused in the ranks of the British by this form of shell was as follows:

Total gas casualties	8,806
Total deaths	532
Deaths per hundred casualties	6

The Germans introduced two new types of gas shell in the middle of July, 1917, namely, the yellow-cross shell, containing mustard gas, and the blue-cross shell, containing toxic chlorarsine compounds. The latter, unlike most gas shells, had a large amount of high explosive in it. This removed one of the features by which a gas shell might be recognized on explosion. The sound was that of the ordinary high-explosive shell, instead of the "wobbling" sound and small amount of noise on explosion that accompanied the gas shell formerly used. In mistaking this shell for high-explosive shell, it is believed that many men failed to don their masks and thereby became gas casualties.

From the time of the introduction of these two types of shell to the end of the war the British Army suffered the following gas-shell casualties:

Total gas-shell casualties for the period	160,526
Total deaths	4,086
Deaths per hundred casualties	2.5

From these figures it will be noted at once that there was a marked and significant change in the results of gas warfare. The number of casualties is extremely large, but the mortality figure is surprisingly low. The great number of casualties is easily accounted for when

one considers that gas was responsible for 15 per cent, approximately, of the total battle casualties of the British Army for the period given. The change can be attributed almost entirely to the introduction of the mustard-gas shell. This gas alone was responsible for 80 per cent of the gas casualties.

Mustard gas, or dichlorethyl sulphide, possesses two properties which differentiate it from other warfare gases and render it a particularly difficult weapon to protect oneself against. These properties are *persistence* and *insidiousness*.

A single inhalation of the ordinary lung-irritant war gases, such as chlorine, phosgene, and chlorpicrin, causes immediate irritation and institutes a defensive reflex at once. Not so with mustard gas. The action of this poison is not accompanied at first with any painful sensation. The only warning is a faint garlic odor, which is mixed with that of mustard. Nevertheless the gas is causing changes in the skin, eyes, and respiratory tract that will later be attended with severe symptoms. Those who are unfamiliar with this property of mustard gas frequently fall into the error of thinking that the absence of primary irritation indicates a concentration which is too low to be harmful.

The explosion of a yellow-cross shell sprinkles the surrounding area with a heavy liquid that has a low vapor pressure, consequently during a long period following the ground and contaminated objects remain impregnated and dangerous. The liquid soaks into any porous material and continues to give off toxic and blistering vapors. Hence, in the absence of an actual bombardment there is always the possibility that there will be casualties among troops that occupy the shelled area. This has been known to happen as long as two weeks after a bombardment. The gas is more persistent in cold weather than in warm weather, as might be expected.

When one is dealing with the lung-irritant gases one is apt to gauge the effectiveness of the gas by its killing power. It is necessary to regard mustard gas in a different light. Its value lies in its casualty producing power.

On the average the first symptoms appear 6 to 12 hours after exposure, but with high concentration lesions have been observed less than 2 hours after contact. In other reports the time is given as averaging 24 to 36 hours.

The clinical picture of mustard-gas poisoning, in general outline, is about as follows: Several hours after exposure the man complains of nausea, headache, and a feeling of fatigue. There is also noted a smarting of the eyes, a watery discharge, and a swelling of the eyelids. Erythema of the skin appears about the same time as the eye symptoms, usually about the face, chest, buttocks, and between the thighs. As a result of the misinterpretation of this initial

erythema nearly all of the first cases were regarded in the first hours as cases of scarlatina and isolated as such. Intensive blisters may develop, the usual site for these being the back, buttocks, scrotum, and wrists.

Inflammatory manifestations of the respiratory passages begin to appear about the second day after exposure, and are characterized by pharyngitis, laryngitis, tracheitis, and bronchitis. The earliest symptoms referable to the lesions in the air passages are hoarseness, aphonia, and cough. Often the cough is painful and incessant. The outstanding fact in connection with these lesions is the formation of a false membrane lining the trachea and bronchi. This is the result of the direct action of the gas. The patient brings up thick purulent or bloody sputum, fragments of the false membrane, or even a cast of a portion of the trachea or bronchi.

The British, French, and American masks protected against any concentration of mustard gas attained in the field, therefore most of the cases admitted for treatment in the allied forces showed only skin lesions and conjunctivitis. Although these lesions were distressing in the symptoms they produced and kept a man on the sick list for several weeks, rarely, if ever, do they, in the absence of involvement of the respiratory organs, cause death. A fatal outcome is usually the result of the direct action of the gas on the respiratory passages or to a secondary infection in the lungs.

In the American Army there were 71,470 admissions as the result of poison gas; 27,119 were mustard gas cases;[1] 34,046 were admitted as having been affected by "other gases"—that is, not classed under the heading of arsine, chlorine, phosgene, or yperite. It is believed that a large number of cases of mustard-gas poisoning may be found classed under the various headings mentioned above.

Mustard gas caused the loss of 1,286,784 days to the American Expeditionary Forces, as compared with 12,545,442 days lost as the result of all battle injuries. From this it would appear that mustard gas must be placed in the foremost rank as a producer of casualties. The Germans originally placed mustard gas in shells of 77 mm., but later they employed shells of all calibers as gas carriers.

No attempt, in this article, has been made to give a comprehensive review of the status of gas warfare, but rather it has been the purpose of the writer to set forth a few of the salient points in connection with this very important subject in the hope that interest may be stimulated among naval medical officers whose opportunity for varied service is so great, embracing, as it does, activities on land as well as at sea.

A subsequent article will deal more particularly with the medical aspects of this subject, touching upon the symptomatology, path-

[1] Report of Surgeon General, U. S. Army, 1919.

ology, treatment, and prognosis of war gas poisoning, and especially with the late effects produced by these irritants.

VENEREAL PROPHYLAXIS AMONG UNITED STATES MARINES AT HONOLULU, HAWAII, IN 1909-10.

By H. H. Lane, Lieutenant Commander, Medical Corps, United States Navy.

The following notes are from a summary of the venereal situation and records made by me when on duty at Honolulu in 1909 and seem worth publishing, as they show definitely what was being done along the line of prophylaxis by the Navy 12 years ago, long before the subject had excited any special interest or effort in other quarters. It is noteworthy that present results are no better than what was accomplished then in spite of the fact that alcohol undoubtedly played an unfavorable and prominent rôle in the etiology of venereal disease at that time. The conditions existing at Honolulu in 1909 were most favorable for the acquisition of venereal diseases by the enlisted personnel of troops in the vicinity.

With a population of about 47,000, comprising all nationalities and representing every degree of social standing, with a good proportion of the very lowest grades, prostitution with its accompanying evils was a decided menace. As an adjunct to prostitution there were numerous saloons and dives of an even lower character, where fiery concoctions of alcohol and aniline were dispensed at a small price. These so-called liquors were exceedingly potent, and it was doubtless true, as stated by the men, that after imbibing more than a very small quantity they had but a hazy recollection of their actions or whereabouts until they grew sick and feverish several hours later.

There was little or no attempt at control of the social evil by the authorities, the system of segregation and venereal inspection which had previously given satisfactory results having been discontinued early in 1908. The apparent center of the traffic was at Iwilei, a squalid district given over to Japanese, Portuguese, Hawaiians, Russians, and Chinese among the denizens of the hovels which lined the wretched streets.

In January, 1909, a battalion of 420 marines arrived and were quartered in tents on made land near the beach within a 5-minutes' walk from the center of town and about 15 minutes from the Iwilei district. The policy of open-door liberty was in force, that is to say, the men not on duty were allowed daily liberty from 2.30 p. m. to 12.30 a. m.

In the first eight months of their sojourn there reported at the sick bay 54 new cases of gonorrhea, 23 cases of syphilis, and 2 cases of

chancroid with the usual complications, this increasing notably the morbidity statistics of the command, namely, to 1,172 sick days for venereal diseases against a total of 1,950 for all causes. On September 1, 1909, a system of prophylaxis was inaugurated at the medical officer's suggestion. This consisted of first cleansing the parts with soap and water, then washing with a 1 to 2,000 bichloride solution followed by an injection of 3 per cent protargol in a 15 per cent glycerine solution, with a local inunction of 33 per cent calomel ointment.

The moral aspect of venereal diseases and their dangers were impressed on the men and every possible precaution was taken to render the treatment as simple and private as possible. A separate room adjacent to the dispensary was fitted up for the purpose. A hospital apprentice was at hand to give needed instruction and to make a record of the treatment, including nationality of paramour, time and place of exposure, and time of reporting for treatment.

After carefully explaining the benefits of the treatment and the desirability of taking advantage of it, the commanding officer issued an order requiring the men who had exposed themselves to possible infection to take the treatment on returning to camp, under penalty of court-martial. Under this ruling several men were sentenced to lose $10 pay, the object being to enforce the order without undue punishment. After a few weeks a number of the men became lazy or careless and neglected to take the prophylactic after each coitus, but did take it sufficiently often to prevent the medical officer from definitely proving disobedience of the existing order. A crusade of moral suasion had some slight effect, but the object lesson of a man neglecting treatment and contracting venereal disease from the same source where another who took the prophylactic had gone free had, I believe, a more salutary effect, inasmuch as the number of applications increased in a ratio to correspond with the decrease in the incidence of venereal disease. We had then at the marine barracks a period of 8 months without prophylaxis and of 12 months with prophylaxis, with the appended result which speaks for itself. The average complement was about 400.

I would add that a rigid venereal inspection was made before inaugurating the system, that a careful watch for concealed venereal disease was maintained, and inspections at regular intervals were made to eliminate concealed infections. Reference to Table 1 shows that without treatment an average of 10¼ new cases, or nearly 2½ per cent of the command, appeared per month; with prophylactic treatment the average number of cases fell to 4½ new cases per month; a reduction of over 50 per cent.

For eight months without prophylaxis venereal disease caused a loss of 1,172 sick days, an average of 146½ sick days a month. For 12 months of prophylaxis there was a loss of 885 sick days due to

venereal disease, an average of 73¾ sick days per month: this likewise showing a reduction of about 50 per cent with prophylaxis. In the 12 months after the order was issued there developed 38 cases of gonorrhea, 16 of whom admittedly did not take treatment. In eight of the remaining cases it is doubtful if the prophylactic was used after the actual infecting exposure, as the incubation in these cases was 12 days or over, but the patients being on record as having received treatment at a previous exposure, it was thought unwise to accuse them of false statements, although we were quite sure that the disease was contracted subsequent to the last treatment record. Of the remaining 14 cases, 7 did not take treatment until 9 to 48 hours after exposure, 4 after a period of 7 hours or over, and 3 within a 3-hour limit. Of the 9 men who developed syphilis, only 2 took the treatment: 1 after an interval of 8¾ hours, and the other 9½ hours after exposure. Of the 2 who developed chancroid, both took treatment, one after 12 hours and one 9 hours after exposure. Our results were far from sensational, but a reduction of even 50 per cent in venereal disease was gratifying and certainly worth the slight effort required. The open-door policy of liberty and the nearness of the source of infection increased the difficulty of enforcing the order. The tendency of a few of the men to ignore the order and avoid the punishment by taking the treatment often enough to prevent the medical officer from charging them with disobedience was a serious handicap; but reference to the appended tables (1 and 2) shows a decided lessening of incidence of venereal infection with a corresponding reduction in sick days. The treatment seemed to give best results in reducing the incidence of syphilis, next in gonorrhea, and was least favorable in chancroid. But it is a matter of interest to note that the cases of gonorrhea who took prophylactic treatment ran a milder course, apparently being favorably influenced by the injection.

TABLE I.

EIGHT MONTHS WITHOUT PROPHYLAXIS. ADMISSIONS ONLY.

Venereal diseases contracted in Honolulu, Hawaii.	Gonorrhea and complications.	Syphilis and complications.	Chancroid and complications.	Total sick days.
1909.				
January	4	0	1	37
February	9	2	1	41
March	7	4	0	80
April	8	1	0	36
May	4	5	2	74
June	5	5	0	209
July	10	3	0	321
August	8	3	1	374
Total	55	23	5	1,172

TABLE 1—Continued.

TWELVE MONTHS WITH PROPHYLAXIS. ADMISSIONS ONLY.

1909.				
September	3	0	0	58
October	3	1	0	88
November	5	1	0	50
December	6	3	0	71
1910.				
January	4	1	1	145
February	4	2	0	168
March	2	1	0	85
April	0	0	0	0
May	3	0	0	36
June	1	0	0	62
July	5	0	0	72
August	2	0	1	82
Total	38	9	2	885

NOTE.—Prophylactic treatment adopted September, 1909.

Average venereal infections per month without prophylaxis:	
Gonorrhea	6.750
Syphilis	2.850
Chancroid	.625
Total average per cent without prophylaxis	10.225
Total average per cent with prophylaxis	4.215
Total per cent reduction which may be credited to prophylactic measures	4.010
Average venereal infections per month with prophylaxis:	
Gonorrhea	3.300
Syphilis	.750
Chancroid	.165
	4.215

TABLE II.

	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	Total for year.
Reported for prophylactic treatment	12	34	61	108	117	143	140	143	138	138	168	90	1,292
Uninfected	12	34	60	104	112	141	136	143	135	138	164	87	1,266
Infected	0	0	1	4	5	2	4	0	3	0	4	3	26

Chancroid, 2. Prophylaxis taken after 12 and 9½ hours, respectively.
Syphilis, 2. Prophylaxis taken after 8¾ and 9½ hours, respectively.
Gonorrhea, 22.

THE CAPTURE OF THE MANILA GALLEON.

HISTORICAL.

THE MANILA GALLEON.

Extracted from "A Voyage Around the World in 1740-1744." [1]

By W. M. Kerr, Lieutenant Commander, Medical Corps, United States Navy.

Toward the end of January, 1742, a little squadron of British ships in command of Commodore George Anson, Royal Navy, approached the western coast of Mexico, then a Spanish colony. England was at war with Spain and these vessels were, in part, the remains of a fleet which on the 18th of September, 1740, had sailed from England on a cruise into the Pacific for the purpose of attacking Spain "in her distant settlements."

The squadron consisted of two British men of war, the *Centurion* "of 60 guns," Anson's flagship; the *Gloucester* "of 50 guns," Captain Matthew Mitchell; and three captured Spanish ships which had been converted into war vessels. They were the *Carmin* "of about 270 tuns burthen," the *Carmelo* of like size, and the "*Tryal's Prize*." This latter ship had been captured by the crew of the sloop *Tryal*, which after the engagement was found to be so badly damaged that her destruction was considered advisable. Her captain and crew were transferred to the captive ship and the British ensign hoisted.

The expedition so far had been fairly successful in spite of great adversities. The town of Paita on the coast of Chile had been plundered and burned, many thousands of pounds sterling in silver seized, and several Spanish vessels taken and destroyed. Now, the ships, bent on capturing the richest prize known, were "using all possible dispatch" in getting to the northward of the harbor of Acapulco for the purpose of "intercepting the Manila Galeon." The usual time for the arrival of the galleon at Acapulco had passed, yet the officers of the squadron possessed the sanguine expectation that some accidental delay might have "lengthened out her passage beyond its usual limits," and that she should fall into their hands before she had opportunity of reaching the shelter of the harbor at Acapulco.

On the 26th of January the fleet was standing to the eastward, expecting to make a landfall in the morning, when there happened

[1] In this paper, which is introductory to a short series of articles on the medical aspects of Anson's voyages, the present tense of the verbs, as used by the original writer of the account of this voyage, has been changed to the past in some of the quotations to agree with the tense used in telling the story.

one of those ludicrous occurrences which are the foundation of so many wardroom tales. About 10 o'clock at night the watch on the *Centurion* discovered a light on the port bow. The *Tryal's Prize*, which was about a mile ahead, "made a signal for seeing a sail"; and as none on board the vessels had any doubt but that they saw a ship's light, "they were all extremely animated with a firm persuasion that it was the Manila Galeon." What pleased them most was their "expectation of meeting with two of them instead of one," for each took it for granted that the light they saw "was carried in the top of one ship for a direction to her consort."

The *Centurion* pressed forward with all her canvas, "making a signal for the *Gloucester* to do the same." Thus they "chased the light, keeping all hands at their respective quarters under an expectation of engaging in the next half hour," as they "sometimes conceived the chase to be about a mile distant, and at other times to be within reach of the guns; and some on board positively averred that besides the light they could plainly discern her sails." Anson himself was so fully persuaded that the squadron soon would be alongside of the enemy ships that he sent for his "first Lieutenant, who commanded between decks, and directed him to see all the great guns loaded with two round-shot for the first broadside, and after that with one round-shot and one grape," strictly charging him not to fire a gun until the *Centurion* had arrived within pistolshot of the enemy.

So with guns loaded and the men stripped for action, they continued the pursuit all night, "always presuming that another quarter of an hour would bring them up with this Manila ship, whose wealth with that of her supposed consort" was "estimated by round millions." But when morning broke and daylight came they were "most strangely and vexatiously disappointed, by finding that the light which had occasioned all this bustle and expectancy was only a fire on the shore upon a very high mountain."

At sunrise, "after this mortifying delusion," they found themselves "about nine leagues off the land," in line with two regularly formed hummocks, which the nautical writers of those days usually called "paps." A captured Spanish pilot and two Indians, who were the only persons on board claiming to be familiar with this part of the world, declared them to be over the harbor of Acapulco; but Anson doubted the pilot's knowledge of the coast, for he "found those paps to be in the latitude of 17° 56′, whereas those over Acapulco were said to be in 17° only." He afterwards determined his suspicions of the pilot's skill to be well founded, but at this time both the Spaniard and the Indians appeared to be very confident and assured the commodore that "the height of the mountains was itself an infallible mark of the harbour."

Now that the squadron was in the track of the Manila galleon it was necessary to ascertain "whether she was or was not arrived." The prisoners assured the commodore "that she was sometimes known to come in after the middle of February," and they endeavored to convince him "that the fire seen on the shore was a proof that she was as yet at sea," it being customary, as they said, to make use of these fires "as signals for her direction when she continued longer out than ordinary." Influenced by this argument, Anson determined to cruise off the coast with the expectation of intercepting the galleon. Accordingly he maneuvered his ships "at a distance of 12 leagues from the coast in such a manner that it was impossible she should pass unobserved." However, not seeing her sails on the sparkling waters of the Pacific to the westward of the *Centurion*, Anson was "at intervals inclined to suspect that she had gained her port already," so he determined to send an expedition "under colour of the night" into the harbor of Acapulco to see if the Manila ship was there. A barge was dispatched on the 6th of February in charge of two officers, who took with them the Spanish pilot and an Indian who had offered to guide the expedition.

The barge returned in five days with the discomforting information that "there was nothing like a harbour in the place where the Spanish pilot had asserted Acapulco to lie." The two officers had sailed along the shore to the eastward for a distance of "thirty-two leagues," and saw only "sandy beaches of a great length;" yet at a very great distance to the eastward they discerned two paps which from their appearance and latitude they concluded must be the hills in the neighborhood of Acapulco, but not having sufficient fresh water and provisions to make further explorations they were obliged to return to the squadron.

On this information the ships made sail to the eastward in order to get into the vicinity of Acapulco. On the following day, which was the 12th of February, the ships "being by that time considerably advanced," the barge was again dispatched, and particular instructions given to the officers "to preserve themselves from being seen from the shore." On the 13th Anson spied a height of land to the eastward which he first imagined to be that over the harbor of Acapulco, but it proved to be the hills behind Sihuatanejo, where there is a small and beautiful harbor with placid waters and sandy beaches shaded by wide-spreading trees.

After waiting some days for the return of the barge, Anson began to be uneasy for her safety; but on the 19th of February she returned. The two officers had discovered the harbor of Acapulco which lay about 50 leagues east-southeast from the squadron. Two days before their return to the ship they had "got within the island that lies at the mouth of the harbour" and yet neither the Spanish

pilot nor the Indian who were with them recognized the place. While they were "lying upon their oars in suspense what to do, being ignorant that they were then at the very place they sought for, they discerned a small light upon the surface of the water, on which they instantly plied their paddles, and moving as silently as possible towards it, they found it to be in a fishing canoe, which they surprised with three Negroes that belonged to it." The officers took the Negroes into the barge and "immediately turned the canoe adrift against the face of a rock, where it would inevitably be dashed to pieces by the fury of the sea: this they did to deceive those who perhaps might be sent from the town to search after the canoe; for upon seeing several pieces of a wreck, they would immediately conclude that the people on board her had been drowned," and would have no suspicion of their having fallen into an enemy's hands. When they had taken this precaution, the crew of the barge "exerted their utmost strength" in pulling out to sea, and by dawn had gained "such an offing as rendered it impossible for them to be seen from the coast."

Anson learned from the three captive Negroes that the galleon had arrived at Acapulco on the 9th of January, that she had delivered her cargo, was taking on water and provisions for her return voyage, and that the Viceroy of Mexico had by proclamation fixed her departure from Acapulco for the 3d of March. This last news was most joyfully received by the officers of the squadron, as they now had no doubt of capturing her. What pleased them most was that she would have on board "the species for which she had sold her cargo" which was "prodigiously more to be esteemed than the cargo itself," a great part of which would have perished on their hands and could not have been sold at a better market than Acapulco.

Thus for a second time they were eagerly expecting to meet this Manila ship, which "by the fame of its wealth" they "had been taught to consider as the most desirable prize that was to be met with in any part of the globe."

As all their future movements were in some way regulated with a view to the possession of this celebrated galleon, and as the commerce which was carried on by means of these vessels between the city of Manila and the port of Acapulco was perhaps the most valuable, in proportion to its quantity, of any in the known world, let us leave the squadron on guard before the green-clad hills of Acapulco and consider for a moment the particulars of the famous trade which existed for years between Manila and Acapulco.

Frederick Magellan, a Portuguese in the employ of the King of Spain, discovered the Philippine Islands in 1521 and claimed them for the Spanish Crown. These islands "were not far distant from those places which produced spices, and were well situated for the

Chinese trade and for the commerse of other parts of India." So a trade was soon established between the Philippines and the Spanish colonies on the coast of Peru, and Manila became "the mart for all Indian commodities."

In its infancy this trade was carried on between the port of Callao and the city of Manila. On the long voyage across the Pacific the trading galleons were favored by the trade winds, so that the voyage was often completed "in little more than two months." But the return of the vessels from Manila was "extremely troublesome and tedious." The first voyages are said to have taken "above a twelve month," because the early navigators attempted to sail due east against the trades. A route to the northward, clear of the trade winds, was soon discovered, and then by the favor of the westerly winds, which generally prevail in high latitudes, the vessels could "stretch away for the coast of California."

At the time our story opens this route had been followed for at least 160 years, Sir Thomas Cavendish, in the year 1586, having engaged off the south end of California a Spanish vessel bound from Manila to the American coast. It must have been soon after the new route began to be used that the Manila trade was removed from Callao to the port of Acapulco on the coast of Mexico to shorten the voyages of the galleons.

One or two ships were employed in the trade between Manila and Acapulco annually. The Manila galleon, as it was called, set sail from Manila about July and arrived at Acapulco in "the December, January, or February following." Having disposed of the cargo, the return voyage to Manila was begun some time in March and completed in June. The whole voyage required very nearly an entire year. "For this reason, though there was often no more than one ship employed at a time, yet there was always one ready for the sea when the other arrived; and therefore the commerce at Manila was provided with three or four stout ships, that, in case of any accident, the trade might not be suspended."

The largest of these ships in 1742 was described as little less in size than one of the British first-rate men of war of that period. She must have been of enormous size, for it is known that once when she was employed with other ships from Manila to prey upon the British China trade, she had no less than 1,200 men on board. The other Manila ships, though far inferior in bulk to this one, were "yet stout large vessels of the burthen of twelve hundred tun and upward, and usually carried from three hundred and fifty to six hundred hands, passengers included, with fifty odd guns."

As these galleons were all the property of the King of Spain, "commissioned and paid by him," one of the captains, "stiled the

General," was in command of the entire fleet. He carried the royal standard of Spain at the main topgallant masthead, "as we shall more particularly observe hereafter."

The Church of Rome was strangely implicated in this trade, according to Richard Walter, M. A., chaplain of His Majesty's ship *Centurion*, who has left us the account of Anson's voyage. He tells us that "this trade to Acapulco was not laid open to all the inhabitants of Manila, but was confined by very particular regulations. * * * The ships employed therein were found by the King of Spain, who paid the officers and crew; and the tunnage was divided into a certain number of *bales*, all of the same size. These were distributed amongst the convents at Manila, but principally to the Jesuits, as a donation for the support of their missions for the propagation of the Catholick Faith; and these convents had a right to embark such quantity of goods on board the Manila ship, as the tunnage of their *bales* amounted to: or if they chuse not to be concerned in trade themselves, they had the power of selling this privilege to others."

The Manila ship having "received her cargoe on board, and being fitted for sea, generally weighed from the mole of Cabite" the port of Manila, about the middle of July, taking advantage of the westerly monsoon to carry her to sea. It appears that the passage through the waters to the south of the island of Luzon was a troublesome bit of navigation and it was sometimes toward the end of August before the vessel passed through San Benardino Strait and got clear of the land. When well out to sea the ship stood "to the northward of the east, in order to get into the latitude of 30 odd degrees," where the captain expected to meet with westerly winds, before which he "ran away for the coast of California."

As this voyage was rarely of less than six months' duration and the ship was "deep laden with merchandise and people," one might wonder how sufficient fresh water was carried for so long a time, "and indeed" says Walter, "their method of procuring it was extremely singular and deserves a very particular recital."

"It is well known to those who were acquainted with the Spanish customs in the South-Seas, that their water was preserved on shipboard not in casks but in earthern jars, which in some sort resembled the large oil jars often seen in Europe. When the Manila ship first put to sea, they took on board a much greater quantity of water than could be stowed between decks, and the jars which contain it were hung all about the shrouds and stays, so as to exhibit at a distance a very odd appearance. And though it was one convenience of their jars that they were much more manageable than casks, and liable to no leakage, unless they were broken, yet it is sufficiently obvious, that

a six, or even a three months store of water could never be stowed in a ship so loaded, by any management whatever; and therefore without some other supply, this navigation could not have been performed. A supply indeed they had, but the reliance upon it seems at first sight so extremely precarious, that it is wonderful such numbers should have risqued the perishing by the most dreadful of all deaths, on the expectation of so casual a circumstance. In short, their only method of recruiting their water was by the rains, which they meet with between the latitudes of 30° and 40° North, and which they were always prepared to catch. For this purpose they took to sea with them a great number of mats, which they placed slopingly against the gunwale, whenever the rain descended; these mats extended from one end of the ship to the other, and their lower edges rested on a large split bamboe, so that all the water which fell on the mats drained into the bamboe, and by this, as a trough, was conveyed into a jar; and this method of supplying their water, however accidental and extraordinary it may at first appear, was never known to fail them, so that it was common for them, when their voyage was a little longer than usual, to fill their water jars several times over."

The Manila ships experienced "other inconveniences generally attendant upon a long continuance at sea." The principal of these was scurvy, "which sometimes raged with extreme violance, and destroyed great numbers of the people"; but often the passage to and from Acapulco was made with little loss.

The length of time employed in the voyage, so much beyond what usually occurred in any other navigation of that period, might be imputed in part to the "indolence and unskilfulness of the Spanish sailors and to an unnecessary degree of caution and concern for so rich a vessel." On these ships the mainsail was never set at night, and when the breezes were excessively brisk they often lay by unnecessarily. "Indeed the instructions given to their captains seem to have been drawn up by such as were more apprehensive of too strong a gale, though favorable, than of the inconveniencies and mortality attending a lingering and tedious voyage; for the captain was particularly ordered to make his passage in the latitude of 30 degrees if possible, and to be extremely careful to stand no farther to the northward than was absolutely necessary for the getting of a westerly wind." This rightly appeared to the Chaplain Walter as a very absurd restriction, for it was known to the British navigators of that period that in the higher latitudes the westerly winds were much steadier and brisker than in the latitude of 30°, and more speed could have been attained.

The Manila ship having "stood so far to the northward as to meet with a westerly wind," ran along in the same latitude for the coast of California until "a plant floating on the sea" was encountered.

The voyagers placed so much reliance upon finding the kelp which grows in vast beds along the shores of California that "on the first discovery of the plant the whole ships company chaunted a solemn *Te Deum*, esteeming the difficulties and hazards of their passage to be at an end." The ship was now turned southward "without endeavoring to fall in with the coast, till they had run into a lower latitude," thus avoiding the islands and shoals which lie off the coast of California.

After some days sailing the navigators ventured to approach the barren coast of Lower California "for the sake of making Cape San Lucas" and to "receive intelligence from the Indian inhabitants, whether or no there were any enemies on the coast."

At the time of which we are writing Spanish missionaries had established a station near Cape San Lucas, from which a few years later the good Franciscan fathers journeyed northward to build the early Californian missions whose ruins we may see to-day at intervals along the coast from San Diego to Solano.

From the grapes grown in the mission gardens at Cape San Lucas a wine was made which was highly esteemed in Mexico, and no doubt orange and lemon trees shaded the garden paths and contributed to the little store of refreshments which were prepared on the arrival of the Manila ship. It is not surprising that the mission fathers should be interested in the safety of the Manila galleon in which the convents in the Philippines were so deeply concerned, and that they should have instructed the Indians of the mission to be on the lookout for any enemy ship which might have been cruising to intercept her.

So it became the custom, when the galleon sighted the land to the north of Cape San Lucas for the captain to be on the watch for the signal fires of the missionaries. After communicating with the shore and receiving the store of wine, fresh fruits, and water "if, from the account which was sent him, he had nothing to fear," he would proceed to Cape Corrientes in Mexico, from which he would "coast it along to Acapulco."

The usual time for the arrival of the galleon at Acapulco was toward the middle of January. But the circumstances attending the voyage were so uncertain that she sometimes reached port a month sooner and at other times was delayed long at sea. The port of Acapulco in those days was much the finest and most secure of any in the Pacific, but the town was a wretched place, even as it is to-day. The place was destitute of fresh water and was in all respects so inconvenient that except when the Manila galleon was in port, it was almost deserted.

When the galleon arrived her cargo was unloaded with all possible haste. The town was crowded with traders from all parts of Mexico who bought the goods, making payment in silver. When

the cargo had been disposed of, the silver, merchandise, and passengers intended for Manila, were taken on board, together with provisions and water and the ship was prepared for sea. No time was wasted, for the King's orders required the captain to take the vessel out of the port of Acapulco on his return voyage, before the 1st day of April.

The galleon being thus fitted for her return, the captain on leaving the port of Acapulco, steered for the latitude of 13° or 14°, and ran on that parallel, "till he got sight of the island of Guam." In order that he would not run past Guam in the night, all through the month of June, fires were lighted every night on the highest point of Guam and the neighboring island Rota and "kept in till morning."

At Guam there was a small Spanish garrison "purposely intended to secure that place for the refreshment of the galleon, and to yield her all the assistance in their power." However, the danger of the roadstead at Guam was so great, that though the galleon was ordered to call there, yet she rarely remained more than a day or two, but getting her water and refreshments on board as soon as possible, she stood away directly for Cape Espiritu Santo, on the island of Samar.

There the captain was again on the lookout for signals indicating the presence of enemy ships. But if there was no danger he would "pursue his course without interruption and make the best of his way to the port of Cabite."

Now, let us return to Anson's squadron, which we left cruising off Acapulco, waiting for the 3d of March, the date fixed by the Viceroy of Mexico for the departure of the Manila ship. The Commodore learned from the three captive negroes that news had been received at Acapulco of the plundering and burning of the town of Paita on the coast of Chile, and that the governor of Acapulco, thinking that the British squadron might attack Acapulco, had strengthened the fortifications and had placed a watch "on the island which lies at the harbour's mouth." This guard, fortunately for the barge, had been removed but two nights before the vessel had ventured into the harbor; otherwise the expedition might have been doomed to failure. The fact that this guard had been withdrawn convinced Anson that his ships had not been observed from the coast and that the governor had no further apprehension of the English attacking the town; so he determined to cruise to the westward of Acapulco, conceiving that in this situation there would be less danger of his being seen from the shore, which was the only circumstance that could deprive him of the immense treasure.

On the 1st of March, the squadron approached nearer to the shore, so that the highlands behind Acapulco were "fifteen leagues distant." Anson arranged his ships in a vast crescentic formation so that "nothing could pass undiscovered." To prevent the galleon escap-

ing in the night, "the two cutters belonging to the *Centurion* and the *Gloucester* were both sent in shore and were ordered to lie all day at the distance of 4 or 5 leagues from the entrance of the port, where, by reason of their smallness, they could not possibly be discovered." In the night they were to approach the harbor's mouth, and "as the light of day came on they were to return back again to their day posts."

On board the ships great preparations were made for the expected engagement. Ammunition was overhauled and gun crews were exercised throughout the long, hot, tropic days. On the 3d of March we can imagine every disengaged member of the crew eagerly gazing across the blue waters toward Acapulco, some perhaps, constantly imagining that they could see one of the cutters returning with the news that the galleon was standing out of the harbor. But that day and "the succeeding night" passed without any word of her.

However, the crew did not yet despair of the encounter with the Manila ship. Many rumors were circulated around the decks to account for the nonappearance of the galleon. Day after day passed and with each sunset a little of their eagerness abated. By the middle of the month "general dejection and despondency" was everywhere. It is true there were some who still kept their spirits up and were "very ingenious in finding out reasons to satisfy themselves that the disappointment had only been occasioned by a casual delay of the galeon, which a few days would remove, and not a total suspension of her departure for the whole season." But the crew were convinced that the enemy had, by some accident, discovered the squadron and had therefore "laid an embargo on the galeon till the next year." And that is just what had happened. The barge which had discovered the harbor and had captured the three negro fishermen had been seen from the shore and that was sufficient proof of the presence of the British squadron to stop the departure of the galleon.

When it became apparent that the Manila ship was not to sail, Anson considered a night attack on the town, but this plan was given up because the prevailing winds did not favor his entrance into the harbor under cover of darkness.

The supply of fresh water in the squadron was now "found to be very slender," so Anson sailed up the coast to the harbor of Sihuatanejo often interrupted in his progress "by calms and adverse currents." On the 7th of April, "after a four months continuance at sea * * * and having but six days water on board" the squadron came to anchor.

A month was spent in this delightful harbor, repairing the rigging, replenishing the water supply, fishing, and removing the stores from the Spanish ships to the *Centurion* and the *Gloucester*, preparatory to a voyage across the Pacific. As the commodore expected

to encounter tempestuous weather on the coast of China, and as the two British ships were short-handed, he determined to reinforce the crews of the two warships by the men on the Spanish vessels, and, after stripping these ships of all useful gear, to scuttle them. This was done on the 27th of April, and soon after the *Centurion* and the *Gloucester* weighed anchor, hoisted sail, and started their long voyage across the Pacific.

Toward the end of July the ships had reached the vicinity of the Ladrone Islands. The *Gloucester* having become unseaworthy, her people and such stores and prize money as could be saved were taken over to the *Centurion* and she was set on fire. The *Centurion*, the last of the vessels which had left England, continued on her westward course and on the 27th of August sighted the islands of Saipan and Tinian. Anson found Tinian an excellent place for the refreshment of his crew, the recuperation of the sick, and the replenishment of his provisions and water. He remained at this island until the 21st of October, when he departed, steering a course for Macao, where the ship came to anchor on the 12th of November. At Macao, after many vexatious delays, the *Centurion* was completely overhauled and provisioned and on the 19th of April 1743, "at three in the afternoon of that day, weighed and made sail and stood to sea."

Anson had let it be known at Macao that he was bound for Batavia on the island of Java, and thence to England. "But his real design was of a very different nature." He believed that as he had prevented one Manila ship from leaving Acapulco the preceding season, there would be two of these vessels bound to Manila that year. He therefore resolved to cruise for them off Cape Espiritu Santo, on the island of Samar, which was the galleon's first landfall in the Philippine Islands.

He knew the galleons "to be stout vessels mounting forty-four guns apiece, and carrying about five hundred hands, and might be expected to return in company." The *Centurion* had but 227 hands on board "of which nearly thirty were boys." This disproportion of strength did not deter the gallant commodore. He knew his ship was better fitted for a sea encounter than the Spanish vessels, and he had a good reason to expect that his crew would "exert themselves in the most extraordinary manner, when they had in view the immense wealth of these Manila galeons."

When Anson was well out at sea, "he summoned all his people on the quarter deck and informed them of his resolution to cruise for the two Manila ships of whose wealth they were not ignorant. He told them he should chuse a station, where he could not fail of meeting with them; and though they were stout ships, and full

manned, yet, if his own people behaved with their accustomed spirit, he was certain he should prove too hard for them both, and that one of them at least could not fail of becoming his prize: He further added, that many ridiculous tales had been propagated about the strength of the sides of these ships, and their being impenetrable to cannon-shot; that these fictions had been principally invented to palliate the cowardice of those who had formerly engaged them; but he hoped there were none of those present weak enough to give credit to so absurd a story: For his own part, he did assure them upon his word, that, whenever he met with them, he would fight them so near, that they should find, his bullets, instead of being stopped by one of their sides, should go through them both."

This speech was answered by three rousing cheers and "all declared their determination to succeed or perish whenever the opportunity presented itself."

Now all their hopes which had subsided since leaving the coast of Mexico were revived, each man believing that he should yet be repaid for his hardships and fatigue and should at last return to England "enriched with the spoils of the enemy." Firmly "relying in the assurances of the Commodore that they should certainly meet these vessels," not a man doubted that they would be captured; many considered "themselves as having them already in their possession." This confidence was so universal throughout the whole ship's company "that the Commodore having taken some Chinese sheep to sea with him for his own provision, and one day enquiring of his Butcher, why, for some time past, he had seen no mutton at his table, asking him if all the sheep were killed, the Butcher very seriously replied, that there were indeed two sheep left, but that if his Honour would give him leave, he proposed to keep those for the entertainment of the General of the galeons."

The *Centurion* arrived off Cape Espiritu Santo on the 20th of May, 1743. As Spanish sentinels were posted on this cape to signal the ship from Acapulco, when she was sighted, Anson ordered the topgallant sails to be taken in to prevent the *Centurion* being discovered, and began his wait for the appearance of the galleon. There was the "utmost impatience" among the crew in spite of the excitement of preparing the vessel for the fight.

As the days passed the "expectancy increased." The treasure of the galleons engrossed their imagination completely at first, and we can easily picture to ourselves the disappointment of these sailormen when the certainty of the arrival of the Spanish ships "dwindled down to probability only, and that probability became each hour more and more doubtful."

However, on the 20th of June, just a month after the *Centurion* had arrived off Cape Espiritu Santo, they were relieved from "this

state of uncertainty." At sunrise a sail was discovered from the masthead. On this "joy spread through the whole ship, for there was no doubt but this was one of the galleons, and the other would soon appear."

Anson stood toward the sail and by half after 7 was near enough to see the stranger from the *Centurion's* decks. She proved to be the expected vessel. The galleon fired a gun, and took in her topgallant sails, "which were supposed to be a signal to her consort, to hasten her up; and therefore the *Centurion* fired a gun to leeward, to amuse her."

The galleon did not change her course but continued to bear down upon the British vessel; for, as it was afterwards learned, the Spanish commander knew her to be the *Centurion*, and had resolved to fight.

About noon Anson had brought his vessel to within a league of the galleon which could not now escape. No second ship appearing, he concluded that the Spanish vessel had been separated from her consort. Soon after noon "the galeon haled up her fore-sail, and brought to under top-sails, with her head to the northward, hoisting Spanish colours, and having the standard of Spain flying at the top-gallant mast-head."

On board the *Centurion* everything had been prepared for an engagement. Anson "picked out about thirty of his choicest hands and best marksmen, whome he distributed into his tops, and who full answered his expectations, by the signal services they performed." He had not men enough to station "a sufficient number to each great gun, in the customary manner;" therefore, on the lower tier he placed only two men at each gun who were to load it. The rest of his gunners were divided into gangs of 10 or 12 men each who were to move about the decks, run out, and fire such guns as were loaded. In this way he was able to use all his guns, and instead of firing "broadsides with intervals between them," he was able to keep up a constant fire which was a distinct advantage, inasmuch as the Spaniards were accustomed to lie prone upon the decks when in battle they saw a broadside being prepared and to remain in that position until it had been fired and the danger was over. By firing gun by gun, Anson determined to render this practice ineffective.

Toward 1 o'clock the *Centurion*, being within gunshot of the enemy, hoisted her broad pennant and colors, and, as the Spaniards were seen making preparations for battle with some confusion, Anson opened fire and the engagement began in earnest. During the first half hour of the fight Anson "over-reached the galeon, and lay on her bow," where, because of the wideness of the *Centurion's* ports, her guns could sweep the enemy's deck. Only a few guns had been fired when

the mats with which the Spaniards had stuffed the netting of the galleon took fire and "burned-violently, blazing up half as high as the mizen-top."

This conflagration which had been started by burning wads from the *Centurion's* guns threw the Spaniards into great confusion, and indeed alarmed Anson "for he feared least the galeon should be burnt." and the prize lost. But the sailors on the galleon at last "freed themselves of the fire, by cutting away the netting, and tumbling the whole mass, which was in flames, into the sea."

The *Centurion* kept her advantageous position. The gunners fired "with great regularity and briskness." The galleon's deck was exposed to the fire of the *Centurion's* topmen, who, "having at their first volley driven the Spaniards from their tops, made prodigious havock with their small arms, killing or wounding every officer but one that ever appeared on the quarter-deck." The "general of the galeon" was wounded, yet he fought his ship an hour after being hit. But the *Centurion's* grapeshot swept the galleon's decks so effectively, and the number of Spanish slain and wounded was so great, that "they began to fall into great disorder, especially as the General, who was the life of the action, was no longer capable of exerting himself."

Early in the engagement the galleon's colors had been burned off the jack staff, and at last the royal standard of Spain was lowered from her main topgallant masthead and she surrendered.

Thus did the *Centurion* gain possession of the Manila ship. She was called *Nostra Signora de Cabadonga* and was commanded by General Don Heronimo de Montero. She was much larger than the *Centurion*, having 550 men and 36 large guns.

On board of her Anson found 1,313,843 pieces of eight, and 35,682 ounces of virgin silver, which we may suppose brought cheer to the hearts of those doughty adventurers who had left Merry England for the purpose of attacking Spain in her distant settlements.

EDITORIAL.

ON LEARNING TO WRITE.

Katharine Fullerton Gerould, writing in the Atlantic Monthly on "What constitutes an educated person to-day?" tells us, among other things, that no man can fairly be called educated who has not the power to use his native language correctly. "An educated man can not be illiterate. This test will occasionally exclude a full professor in a reputable university. That makes no difference. No man is educated whose grammar is shaky. He may have a Ph. D. from any place you like; but if he confuses adverbs and adjectives he is not an educated man."

At times we all use the English language carelessly, yet on a perusal of the annual sanitary reports, which should reflect an officer's best efforts, one is struck forcibly by the errors in composition, in grammar, and in rhetoric which some of us persistently make.

Every medical officer should learn to write well early in his career, as much of his reputation depends upon the care with which he prepares his reports and other official correspondence. How may we learn to write? Robert M. Gay, professor of English, Simmons College, Boston, in a little book called "Writing Through Reading," gives us some hints. Writing is an art which can be developed by practice and by careful reading. Bacon said that "reading maketh a full man," and by that he meant that we get the greater part of our ideas, notions, and opinions from reading. But he also said that "writing maketh an exact man;" "writing impresses what we read on the mind and fixes it deeper."

As a discipline in close, thoughtful, and discriminative reading, nothing can be more valuable than having to record in some form the thoughts read. Getting at the thought requires concentrated attention.

The process of writing, as Goethe said, keeps the thoughts from wandering. If the writing has as its object the reproduction of the thoughts read, the reader can not, as he otherwise might, be content with a vague or general apprehension of the passage he is reading. There is a compulsion upon him to understand every word and the relation of each word to every other, and the contribution of each and all to the complete train of thought.

Reproduction of thoughts read has an advantage over original writing in that it permits you very definitely to gauge your success,

and the passage reproduced serves as a standard with which you can always compare your version. Reproduction taxes your vocabulary as original writing is little likely to do. The connection between thought and language is so intimate that our ideas are limited to the words we possess. Reproduction affords a more practical method of acquiring versatility in framing sentences than does original writing.

The competent handling of the sentence is one of the chief marks of maturity in a style. If your sentences are elementary in form—short, simple, disjointed, or loose-jointed—and faulty in rhythm, read the writings of Thomas Babbington, Macaulay, or of Lafcadio Hearn. The sound and natural way to master the art of framing sentences is to read the sentences of an author who knows how to make them, and to read them over and over, preferably aloud, in their place and context, until their length, phrasing, and rhythms have been, so to speak, learned by heart. When you have done this make a series of sentences of your own, using different thoughts, but following the exact model of those you have read, one of yours for each of the others, and you will learn very rapidly much about the art of making sentences. But this exercise must be done with alert intelligence, observing how each sentence owes its form solely to the thought, its parts, and their relations.

Good writing is quite largely a matter of feeling. It is partly an affair of the ear, and the ear can best be trained through reading aloud, copying, and memorizing. A good way in which to improve one's writing is to copy, after careful preliminary oral reading, a passage of good contemporary prose, observing its structure and the relations of parts to each other, using the dictionary faithfully, and keeping in mind the fact that you are not merely copying words but are transcribing thoughts, and what you learn in your practice will eventually affect profoundly your original writing.

Direct imitation of the writings of masters has great value in learning to write. In fact, Stevenson said that imitation is the "only way to learn to write." He advised the imitation of as many authors (of the widest diversity of styles) as you can, because only by so doing will you be likely to achieve both facility and versatility in writing. Eventually all the styles you have imitated will commingle; and with the growth of your personality and originality, your own style will emerge, the stronger and richer for your practice. "Before he can tell what cadences he truly prefers," says Stevenson, "the student should have tried all that are possible: before he can choose and preserve a fitting key of words, he should long have practiced the literary scales."

I imagine that in his youth when learning to write, Stevenson read his original over and over aloud, until he had caught the rhythm, cadence, or general movement by ear, and, meanwhile, registered

upon his mind the qualities and idiosyncrasies of the style. Then he took another but suitable subject and tried to express his thoughts on it in the manner of his chosen author. This certainly is a good plan for the improvement of diction and it helps one to achieve vigor of style. Tame expression is usually due to the use of abstract and general words, overworked words, and epithet. Vigorous writing is the result of a knack of using concrete and specific words, homely idioms, and simple metaphors. This knack may be obtained by having care of our speech, by circumspect reading, by discriminating among synonyms, by habitually using the dictionary; but the natural way of acquiring it is by imitating those authors who have it.

In his Autobiography Benjamin Franklin tells us that he learned to write by reading and rereading an essay from the Spectator, meanwhile recording "hints" of the sentiment of each sentence, and then, a day or two later, without looking at the original but using the hints as a guide, writing an essay on the same subject matter and of the same length as the original and then comparing his version with the original in the Spectator on which it was based. Stevenson's plan was distinctly imitative. Franklin's was emulative. He did not try to write *like* Addison but he tried to write *as well* as Addison. Stevenson wrote in the presence of his model; Franklin in its absence. Stevenson used many models; Franklin but one. Franklin's plan is especially good as practice in sentence structure.

The success of Franklin's method lies wholly in the choice of a proper model. For Franklin, the value of the Spectator lay in the variety of its contents. It contained the best journalistic writing of his day. The student of to-day can apply it to specimens of contemporary writing such as might be found in the Atlantic Monthly or Outlook.

ON SEVERAL PHASES OF SYPHILIS.

I remember listening once, in the days before the Wassermann reaction and the use of salvarsan had thrown so much light upon the treatment of syphilis, to a discussion between two old practitioners as to the relative merits of the line of treatment each employed in the "cure of syphilis." In the light of our present knowledge neither of these men knew much about the treatment of this disease and neither had ever cured a single case; but they *did* know a lot about the signs and symptoms of syphilis which in those days of inefficient treatment were seen in all their varieties by everyone in general practice. The modern method of treating syphilis has changed the picture of the disease somewhat and we do not as frequently see what used to be known as its secondary and tertiary manifestations. In

the Navy, syphilis is generally recognized at the onset and promptly treated, with the result that secondary lesions do not appear and are not familiar to the younger generation of medical officers.

Occasionally a patient in the secondary stage of syphilis with its lesions not exactly typical, will pass before us: and we should always bear this disease in mind when confronted by strange skin lesions, and not place too much reliance upon a denial of exposure to infection on the part of the patient. The following case is rather illuminating and shows the difficulties encountered by the medical advisor as well as by the patient.

A man reported at sick call complaining of sore throat and "aching in his bones." His temperature was 102 F. Physical examination revealed a diffuse pustular eruption on his head, body, and extremities. He had enlargement of the post-cervical lymphatic glands and a sore on the penis. He was sent to a hospital with "diagnosis undetermined."

At the hospital he claimed that five days before the appearance of the eruption he had noticed a "ring worm" on the dorsum of his penis which he had treated by application of tincture of iodine which produced an ulceration. He gave a history of sexual intercourse 16 weeks prior to his admission to the hospital. He was emaciated and had lost weight recently. The ulcer on the penis was not especially indurated. There was no general enlargement of the superficial lymphatic glands noted, but the inguinal glands were palpable and there was "possible epitrochlear adenitis." The eruption was multiform, consisting of vesicles, macules, pustules, and bullae, varying in size from a quarter of an inch to an inch in diameter.

A "dark-field" examination of the serum from the lesions failed to reveal the *Treponema pallidum* and the Wassermann reaction was negative.

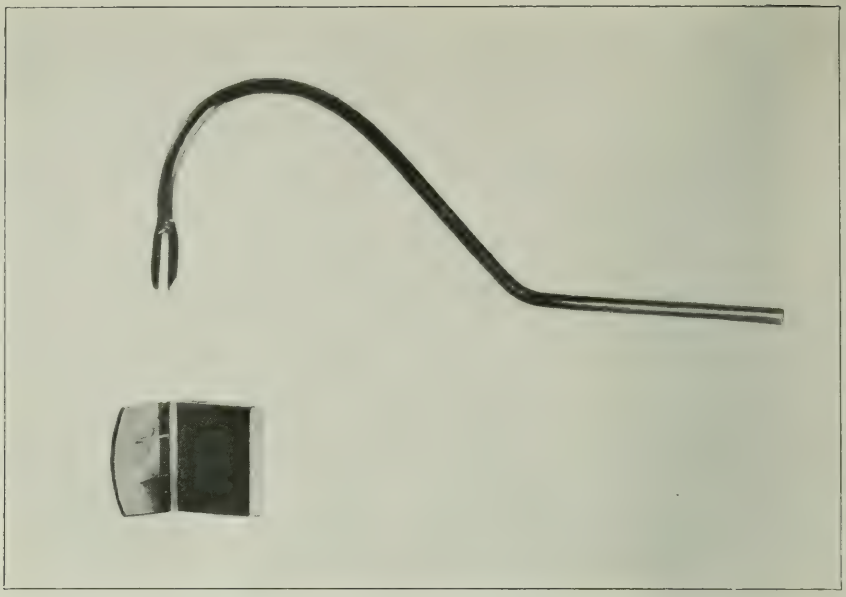
The ulcer was cauterized with silver nitrate and wet dressings of chlorazene were applied. Wet dressings of magnesium sulphate were applied to the skin eruptions and the patient was given, three times a day, increasing doses of Fowler's solution.

There was no improvement in the patient's condition after 10 days of this treatment and the temperature had remained in the neighborhood of 101 F. Syphilis was believed to be the cause of the patient's symptoms, but he would not admit this diagnosis and refused to sign the syphilitic abstract in his health record, although he gave oral permission for the administration of neosalvarsan.

Because of the patient's attitude toward his condition he was transferred to the United States Naval Hospital at Washington, D. C., for observation and treatment. His physical examination, on admission, showed nothing noteworthy except the skin lesions which covered

the entire body. They appeared in successive crops, accompanied by a rise in temperature. Each crop passed through the macular, papular, and pustular stage in three or four days. The pustules became crusted and exuded a purulent exudate. The lesions were surrounded by an inflammatory areola. They were markedly discrete and did not itch, nor were they painful. There was no involvement of the mucous surfaces.

"Dark-field" examinations of lesions were negative for *Treponema pallidum* and two Wassermann reactions were negative. He was given 0.45 grams of neosalvarsan intravenously, and an immediate improvement was noted. The inflammatory areola around the lesions faded rapidly. The ulcer on the penis which had been open now nearly three months began to heal and the lesions on the body began to dry up. His fever disappeared and his general appearance improved. An intensive course of neosalvarsan was begun and coincidently the Wassermann reaction became positive and remained so for a month. Under the neosalvarsan the condition cleared up. A diagnosis of syphilis was officially made and the patient was discharged to duty under treatment, after being under observation 64 days, during which time the nature of the disease was fully explained to him by his medical advisors. An official communication from this individual recently has been received by the Bureau of Medicine and Surgery, stating that he was not convinced that he had had syphilis and requesting that the diagnosis of syphilis be removed from his health record!



1. HOLDER AND POINTER.

2. FILM IN HOLDER, POINTER ATTACHED.

3. HOLDER AND FILM IN MOUTH, POINTER ATTACHED.

4. FILM AND HOLDER IN MOUTH, POINTER DETACHED.

SUGGESTED DEVICES.

DENTAL X-RAY FILM HOLDER.

By H. E. Harvey, Lieutenant Commander, Dental Corps, United States Navy.

A very ingenious and practical film holder has been developed and patented by Lieutenant H. G. Ralph, of the Dental Corps. It consists of two parts, the holder of which goes in the month of the patient, and a removable guide or pointer which can be detached after the holder is in position. A portion of the holder projects as a flat metal lug at right angles to the plane of the film, and this lug is held firmly between the closed teeth of the patient while the X-ray is being taken.

The construction and use of this type of holder presents the following advantages:

First. The film is held behind the selected teeth without the possibility of slipping.

Second. The area necessary to obtain a definition of the apices is covered.

Third. The jaws being closed allows relaxation of the adjacent muscles, thus frequently obviating the tendency to gag, particularly when raying the lower posterior molars.

Fourth. A removable pointer indicates the plane and position of the film after it has been inserted in the mouth and the jaws closed, which is a material aid in getting the correct angle for the tube.

Fifth. The holder and pointer are entirely of metal, and can be sterilized by boiling.

Sixth. The appliance is of sufficient durability to be practically indestructible.

In lieu of a more detailed description illustrations are given.

SUGGESTION FOR RECORDING DENTAL CONDITIONS.

By H. E. Harvey, Lieutenant Commander, Dental Corps, United States Navy.

The following system is one which has been found to meet the requirements for recording at the chair the first dental examination, without the aid of an assistant:

Letter-size paper is cut in three strips, corresponding to the folds of official correspondence.

A space of 2 inches is left at the top of a slip for the name, rank, date, and ship or station. Abbreviations are made down the left side of the sheet for conditions to be noted. M for missing teeth, Ro for roots only, C for caries, Am for amalgam fillings, G for gold fillings, G. C. for gold crowns, Cem for cement fillings, and Br for bridges.

When the examination is to be made a slip is placed upon the bracket table and a pencil is wiped with Dakin's solution to prevent the possibility of cross infection.

It has been found convenient to first ascertain the teeth missing, which are noted by numbers after M., and then to record fully the condition of each tooth, starting with the tooth of the lowest number and placing after the proper abbreviation the number of the tooth and location of cavity or restoration. Thus we have upon completion of the rough chart:

Brown, John Bryan, S–2; Hospital. Washington, D. C.; June 29, 1921.
M. 1—16.
C. 2—DO; 7—M; 30—O.
Am. 3—MoD; 31—DO.
G. 8—M.
Cem. 9—M.
Br. 12—14.
GC PF PF GC.

As work is performed it can be noted on the reverse side of the sheet under date, and initialed by the dental officer, in addition to the entry in the record book.

When time permits the smooth dental abstract and dental record can be made from the rough sheet as outlined above, as all data necessary for completing the smooth records will be at hand.

ULCERATIVE LESIONS OF SPOROTRICHOSIS.

CLINICAL NOTES.

A CASE OF CUTANEOUS SPOROTRICHOSIS.

By R. E. Hoyt, Commander, Medical Corps, United States Navy.

From the viewpoint of differential diagnosis the following case presents many interesting details and brings up for consideration several affections not often encountered in routine practice.

T. J. D. GM—3cl. American, single, age 20, was admitted to the hospital on April 29, with the diagnosis of purpura, hemorrhagic.

His family history was irrelevant, showing nothing to indicate any congenital blood disease, syphilis, tuberculosis, or chronic skin affections.

With the exception of measles in childhood the patient has always been well, robust, and active. He has led an out-of-door life, taken an active part in athletics, and after entering the Navy was a member of the ship's race-boat crew. His weight was 185 pounds before present illness.

He enlisted in 1919 and was assigned to the U. S. S. *Arizona*, on which ship he served up to the time of his transfer to the hospital. During February and March of the present year the ship visited Guantanamo Bay, Cuba; Callao, in South America; Balboa in Panama, and then returned to Guantanamo. The patient was ashore at all points visited on short sight-seeing trips not lasting over a few hours.

The present illness began on April 20, two weeks after the ship returned to Guantanamo, the patient first noticing a small, hard, slightly tender swelling on the inner side of left leg just above the ankle, which slowly increased in size, softened, and on the fourth day ruptured, with a discharge of considerable bloody fluid.

A few days later similar lumps of varying size and consistency were noticed on the inner side of the left leg and thigh, and by the end of the second week lesions had made their appearance on the right leg and thigh and a few on the arms.

Practically all the swellings underwent changes similar to the initial lesion—enlargement, softening, thinning, and discoloration of the skin followed by rupture and the discharge of bloody or purulent material.

On the legs and thighs the discharge gradually subsided and ulcers of varying size and depth formed over the sites of the primary swellings. On the arms no ulcer formation occurred, the skin slowly healing over after the discharge had stopped, leaving a small, depressed, discolored area to show where the lesion had been.

With the exception of the above-described lesions, physical examination at the time of admission showed nothing abnormal.

The pulse and temperature were normal. No glandular enlargement. Red, white, differential counts, hemoglobin estimation, and blood-clotting time were normal. Urine normal. Wassermann negative. Blood cultures and cultures of discharges from the ulcers and from fluid aspirated from the subdermal swellings before ulceration occurred were all sterile.

There was no history of any injury or abrasion. No drugs had been taken internally. After rowing, the patient had been accustomed to receiving a rubdown with soap liniment, commonly used on shipboard by members of athletic teams.

During the month following his admission to the hospital the number of lesions increased from about 30 to 75 or 80. The legs and thighs were chiefly affected. A tendency to extension upward over the buttocks and lower lumbar region posteriorly was noticeable, the lesions here being first noticed as hard, circumscribed, subdermal lumps about the size of a pea. Several swellings appeared on the arms and one on the lobe of the right ear.

It was found that by making a very small incision or by aspirating these swellings after softening occurred and before thinning or ulceration of the skin took place the ulcer formation could be easily prevented, the incision healing slowly after a few days' drainage.

During the fourth week of the patient's stay at the hospital, loss of appetite, a feeling of nausea and slight indefinite epigastric pain with evening elevation of temperature to 102° appeared. Following an attempt to swallow a duodenal tube, which caused considerable retching, the patient vomited a quantity of dark bloody material similar to that obtained after rupture of a skin lesion. This was followed by the disappearance of all symptoms and a decline of temperature to normal. Evidently a lesion similar to those present in the subcutaneous tissues had formed and ruptured, either in the stomach or lower esophagus.

At about this time the formation of new lesions ceased and the ulcers gradually filled in and healed over.

With the exception of some loss in weight due chiefly to the confinement to bed, the patient's general condition continued excellent.

For the purpose of establishing a diagnosis the salient points in the above history may be summed up somewhat as follows:

1. The rather sudden appearance in an otherwise apparently normal individual of firm, circumscribed, noninflammatory swellings beginning in the subcutaneous tissue of one leg and extending gradually to all extremities and later to the lower and posterior part of trunk; these swellings followed in a few days by distinct areas of softening, followed by thinning and discoloration of the overlying skin, which on rupturing resulted in the discharge of considerable dark red or yellow purulent material; over these areas of softening, especially on the legs, the development of ulcers of varying size and depth, some extensive, shallow, and irregular, others small, deep, and having a punched-out appearance and communicating with subcutaneous cavities of considerable extent, these cavities representing the spaces occupied by the initial nodular lesions; lesions discovered before the skin necrosis occurred and incised or aspirated showing a discharge of considerable bloody, brown, or yellow serum or seropurulent material and healing more or less promptly after the contents of the swelling had drained away.

2. The lack of evidence of an acute inflammatory process, as shown by normal temperature, normal blood counts; no typical signs of inflammation, such as redness, edema, or induration of tissues; and repeated negative cultures from the blood and material from the lesions. (It should be stated that at the time patient did show a temporary elevation of temperature with abdominal symptoms, blood cultures were negative and white count remained normal.)

3. The elimination of the possibility of luetic infection by an absolutely negative history, absence of any typical physical signs and repeated negative Wassermann tests carefully controlled.

From a careful consideration of the above facts it does not appear that the diagnosis of hemorrhagic purpura can be substantiated, although the appearance of bloody discharges from some of the lesions and purpuralike spots might at first sight suggest this condition. The appearance of these spots seemed to follow the softening of, and to exist over, a softened subdermal lesion of some days standing, the purpuriclike discoloration being rather the result of a thinning and pressure necrosis of the skin than of actual effusion of blood into the skin layers as is typical in purpura. Furthermore, the absence of any symptoms of grave constitutional involvement and the nonexistence of purpuric spots on mucous membranes would be rather against this condition.

Among the conditions which in some instances present lesions similar to those described in the present case may be mentioned syphilis, yaws, cutaneous tuberculosis, sarcoma cutis, fungoid granuloma, erythema induratum, and sporotrichosis.

From a careful consideration of the history, the absence of any other characteristic signs or symptoms, and the persistently negative Wassermann test, it appears logical to eliminate syphilis and yaws.

The comparatively acute course of the present case, the otherwise healthy condition of the patient, the absence of the characteristics of malignant disease, and the prompt healing of the lesions under treatment renders the diagnosis of cutaneous tuberculosis of any variety, sarcoma, or granuloma very unlikely. Negative inoculation experiments are also points against tuberculosis.

Although erythema induratum is described as of probable tubercular origin, occurring almost exclusively in females predisposed to this disease, efforts to isolate the organism from the lesions have not proved successful. Its rare occurrence in the male, the limitation of lesions to legs in nearly all cases, the sluggishness of evolution and absence of the profuse bloody or purulent discharge from the softened areas are points which render this diagnosis improbable, although some few cases with very atypical lesions have been described.

Clinically, the resemblance of the present case to descriptions of cutaneous sporotrichosis is quite marked. In both are found subdermal nodules which soften, rupture, and discharge purulentlike material, through the central skin ulceration. No general systemic disturbances are noted, no blood changes, no signs of inflammation or acute bacterial infection.

The sanguinous character of the discharge from some of the lesions as in the present case is not mentioned in the descriptions of the few cases of sporotrichosis reported. Its occurrence, however, from only the older lesions in which softening is well advanced, with considerable undermining of the skin layers and probable involvement of the smaller superficial veins in the softening process would not be incompatible with the pathological processes encountered in this affection.

Another clinical point of some importance is the apparent beneficial effect of potassium iodide. Coincident with the internal administration of this drug, the formation of new lesions gradually ceased, and the healing of the leg ulcers become more evident. The action of this drug is described by most authorities as curative in sporotrichosis.

Numerous examinations of smears taken from the lesions in all stages of development, while at times showing objects closely resembling spores have not given sufficiently definite results to warrant a positive diagnosis, and mycelial threads were not found. The great difficulty in finding these threads in stained specimens of the material from the lesions is emphasized in all accounts of the disease, but all authorities agree on the comparative ease with which the organism can be cultivated on any ordinary culture media.

During the first weeks of the disease, therefore, the establishment of a definite diagnosis of sporotrichosis was rendered impossible on account of negative culture and inoculation experiments, although it

was the general opinion that the causal organism was the sporotrichium or an allied nonbacterial fungus.

The unexpected appearance of three new lesions in July, after all ulcers had completely healed and the treatment with potassium iodide had been temporarily discontinued, provided material for further investigation which this time proved more successful.

From cultures made with the seropurulent material aspirated from these lesions typical growths of the sporotrichium were obtained on glucose agar tubes, plates, and hanging drop cultures, and smears from these growths showed pure cultures of the organism. The mycelial threads and arrangement of spores were quite characteristic when examined unstained by the hanging drop method.

The diagnosis of cutaneous sporotrichosis, provisionally made from the clinical findings, was therefore confirmed.

The patient was at first treated with potassium iodide, 2 grams daily; later he was given sodium iodide intravenously twice weekly, and no new lesions have appeared to date.

The great importance of differentiating sporotrichosis from cutaneous syphilis should be especially emphasized. The resemblance is so close in some instances that a type called "syphiloid sporotrichosis" has been described. This similarity in lesions with marked improvement under iodides conduces to the diagnosis of syphilis unless the disease sporotrichosis is borne constantly in mind and either confirmed or eliminated by bacteriological procedures. Even with a positive Wassermann the possibility of sporotrichium infection should be eliminated before the skin lesions are recorded definitely as syphilitic.

FIRST REPORT OF PELLAGRA IN HAITI.

By G. F. Clark, Lieutenant Commander, Medical Corps, United States Navy.

The following cases seen at Cape Haitien are reported as the first of the kind ever noted in Haiti. Surgeon Joseph Goldberger, U. S. Public Health Service, states that no pellagra is definitely known to have occurred in Haiti before.

Case 1. H. D. Female, mulatto. Age 32. Admitted April 7, 1920, with pellagra. Examination showed an inflamed tongue; characteristic, symmetrical eruption on the backs of the hands, and extending up the lower one-third forearms; some pigmentation on each side of nose. History of diarrhea. There was some retardation of speech. Since admission she has had several periods of mild melancholia, and at other times she has had periods when she seemed unusually gay. The eruption on the hands has cleared up, but the tongue shows some fissures. The patient is constipated from time to time.

Case 2. N. S. J. Female, mulatto. Age 35. Admitted March 8, 1920; discharged apparently well July 7, 1920. She had characteristic, symmetrical eruption on the backs of the hands and extending up the lower third of forearms. Tongue inflamed; diarrhea. No nervous manifestations, except slight retardation of speech. The area of eruption showed a decided darkening from pigmentation. Operated on for fistula-in-ano and made a good recovery.

Case 3. A. S. Female. Age 37. Admitted November 7, 1920; died November 27, 1920. She had inflamed tongue, diarrhea, and symmetrical eruption on the backs of the hands and forearms. She steadily became worse after admission and died within three weeks. There were no mental symptoms except retardation of speech.

In connection with the above cases it is interesting to note that the caloric value of the ration in the hospital is about 1,800, owing to very limited funds. The three patients were each given citrated beef blood, with the results above noted.

ACUTE RHEUMATIC FEVER.

By W. M. Alberty, Lieutenant, Medical Corps, United States Navy.

It is the purpose of this paper to review some 35 cases of acute rheumatic fever that have come under our observation during the last six months. Especial attention has been directed toward the etiology, or rather the foci of infection, responsible for these cases and the complications that have developed. No cases of the chronic forms have been included in this series.

The definition of acute rheumatic fever, according to Osler, is "an acute infection, depending upon an unknown infective agent and characterized by multiple arthritis and a tendency toward involvement of the endocardium of the heart valves." Geographical distribution, age, and sex have little bearing as to etiology. Up to the present time there has been no organism isolated that we can definitely say is the causative agent. Numerous authors have isolated many different organisms and cited them as the etiological factors, and they might have been in those particular infections. Numerous strains of staphylococci, streptococci, and various other organisms have been demonstrated in the joints, blood, and endocardium, and all have been blamed as the cause of rheumatic fever. For instance, Rosenow, in 1914, isolated three different strains of diplostreptococci from the joints, blood, and tonsils of acute cases and was able to produce the signs and symptoms of rheumatism with its complications by animal inoculation. Another author was able to produce the typical myocardial nodules with the *Streptococcus viridans* by animal inoculation. A short time ago, an organism, the *Mycobacillus syn-*

ovialis, was isolated from the joints and pia mater of a case of cerebral rheumatism and given as the cause of the disease.

So far, I think, joint aspirations have proven negative in a majority of the cases. The futile attempt of numerous investigators to demonstrate organisms in the joints from the blood and the heart valves has left us in the dark as to the direct causative factor in nearly all cases. Riesman, of Philadelphia, in a recent article, advances the theory that the joint manifestations are probably anaphylactic reactions, the result of some foreign protein absorption. This theory is supported by the sudden onset of the joint conditions, the sterility of the joints, and the rapidity with which they subside. Such reactions are not uncommonly seen in serum therapy. The same author suggests the possibility of a filtrable or ultramicroscopical virus.

In attempting to locate the offending focus or foci the following data were collected.

Ten cases, or 28.5 per cent of the entire series, immediately followed an acute attack of tonsillitis.

Eight cases, or 22.85 per cent, gave a history of previous attacks of tonsillitis not directly preceding the rheumatic attack.

Three cases, or 8.56 per cent, gave no history of tonsillitis, but showed a chronic infection of the tonsils. From the above it will be seen that 60 per cent of the cases resulted from infection in the tonsils.

In three cases, or 8.56 per cent, abscessed teeth were demonstrated; no other foci were present.

One case, or 2.86 per cent, was preceded by an acute otitis media, and no other focus was found.

Two cases, or 5.72 per cent, were ushered in by an acute attack of bronchitis, and no other focus was located.

In eight cases, or 22.85 per cent, there was no demonstrable focus.

No effort was made to isolate the organism from the tonsils and no joint aspirations were performed. Work of this sort has frequently been done by other investigators.

The laboratory findings in a number of these cases are as follows:

Blood cultures were taken from 19 of the patients, often two or more times in some instances; all were negative.

The average leucocyte count of 29 patients, taken at the height of the fever, was 12,000.

Average red blood count, taken in 16 cases, was 4,200,000.

Hemoglobin in 16 cases averaged 82 per cent.

It will be noted that a very marked anemia did not exist in these cases, as has been pointed out as one of the characteristics of the disease.

Urine was positive for albumin in only two or three cases, and the condition cleared up rapidly in all of the patients.

Regarding the complications, of which nearly all were referable to the heart, the following points were noted: Mitral lesion, as evidenced by a mitral systolic murmur, was found in 17 cases, or 48.5 per cent of the series. Three, or 8.5 per cent, of the above mitral lesions were accompanied by an aortic lesion.

Pericarditis of the acute fibrinous type, as evidenced by a definite friction rub, was demonstrated in four cases. In none of these cases was there a pericardial effusion demonstrated. However, there probably was some effusion in all of these cases, but not in sufficient amount to demonstrate by physical examination.

Myocardial involvement was present in six cases. This diagnosis was made only in those cases showing dilitation and a weak muscle tone. However, it is hard to realize an involvement of a number of the other structures of the heart without some involvement of the myocardium.

Pleural effusion occurred in only one case in sufficient amount to demonstrate physically. Otitis media developed in two cases.

The patients all appeared to be extremely ill upon admission and nearly all suffered acute pain in the joints. Multiple involvement was the rule, with a tendency to shift from one joint to another. The pain usually subsided in 24 to 48 hours. The temperature averaged about 100° and extended over a period of about eight days.

The treatment in these cases was symptomatic during the acute stages. It consisted of rest in bed, splinting of the affected joints, liquid diet in case of high temperature, and saturating the patient with sodium salicylate. The latter was given routinely in 45-grain doses with the same amount of sodium bicarbonate, and was continued as long as the patient ran a fever or complained of joint pains. It was found that the patients tolerated the large doses of salicylate very well, there being only one or two cases in whom it was necessary to discontinue the drug. Three cases received 180 grains at one dose, by mistake. One of these showed toxic symptoms, evidenced by epigastric pain, nausea and vomiting, which subsided in a very few hours. The other two showed no toxic symptoms whatever.

Patients were kept in bed 10 days following the subsidence of temperature. In cases of heart lesions they were confined for a much longer period and were then allowed up very gradually. All heart cases were given tincture of digitalis, at first in massive doses, and later, after the patient had been digitalized, in smaller doses. Many of these cases require digitalis and graduated exercises over a long period of time if good functional results are to be obtained.

The use of salicylates is almost universal, yet why they are given is not exactly clear. The idea of their being specific is almost aban-

doned at present. Many contend that they shorten the disease but this has never been definitely proven. That they prevent cardiac involvement is rather far-fetched and certainly did not hold true in our cases, as heart lesions often developed in this series after days of thorough saturation with sodium salicylate. There is one argument in favor of the salicylates, their analgesic property. It is true that they are antipyretic, but this is certainly not the effect which we desire when using salicylates in cases of rheumatic fever. That salicylates will relieve pain, and do so fairly rapidly, has been proven beyond a doubt, and it is for this purpose that they are prescribed.

Following the acute stage the patients were referred to specialists for tonsillectomy, dental treatment, or the ridding of any other focus of infection that might have been demonstrated. Clearing up the focus of infection, which is probably present in 85 to 90 per cent of all cases, is considered the only means by which a definite cure may be effected. A large number of tonsillectomies were done, but not in every instance in which the operation was advised, due to the lack of cooperation on the part of some patients. It is impossible from this series to draw any conclusion as to the ultimate cures that were effected by clearing up the different foci of infection. Some of these patients are still under treatment, many have gone to duty, and a small percentage have been invalided from the service. Many cases which showed a very marked heart lesion during the course of the disease have gone to duty with an almost inaudible murmur and a perfect heart function. It is difficult to give, at this time, any prognosis as to the recurrence of the symptoms, as not sufficient time has elapsed since the acute manifestation, and it is difficult to keep in touch with a number of these patients after their discharge from the hospital. St. Lawrence reported a large series of cases in whom tonsillectomy had been performed and there had been no recurrence in 84 per cent of the cases, observed over a period of three and one-half years. These observations were made on children in whom other foci of infection were fairly easy to rule out.

In conclusion, I wish to emphasize the following points that have been brought out in this paper, namely: That the joint manifestations are probably anaphylactic reactions, due to absorption of foreign proteins, in the majority of cases through the tonsils; that infected tonsils were responsible for 60 per cent of the attacks reported in this series, while some 17 per cent were brought on by infections of the teeth, ears, and lungs; that 22.85 per cent presented no demonstrable focus, which, the writer believes, was present in practically all cases but was not demonstrated; that numerous negative blood cultures have proven the sterility of the circulation at different stages of the disease; that heart lesions were present in 48.5 per cent

of the cases, the largest percentage being uncomplicated mitral lesions; that the prognosis in case of heart complications is good, provided the condition is recognized early and appropriate treatment instituted; that salicylate therapy is only symptomatic, relieving pain, and its value as a specific or in preventing cardiac complications is negligible; and lastly that a permanent cure depends upon the demonstration of the offending focus of infection and its thorough eradication.

A CASE OF POISONING BY OIL OF CHENOPODIUM.

By B. F. Norwood, Lieutenant, Medical Corps, United States Navy.

The oil of chenopodium is a pale yellow essential oil distilled from *Chenopodium Ambrosioides* (*Anthelminticum*), commonly known as American wormseed, which grows wild in the southern portion of the United States. It has a characteristic odor and a disagreeable taste. The drug has become popular in recent years because of its value as an intestinal parasiticide and is being extensively used in the treatment of intestinal nematodes. At present it is supposed to be the most effective agent against ankylostomiasis.

Though the effective use of this medicine on a large scale has fully established its field of usefulness in the elimination of intestinal parasites, the more prominent workers have not allowed it to supersede the use of thymol. Opinion as to the usefulness of these two drugs seems about equally divided. In a small number of infections, something less than 2,000, we obtained a greater percentage of egg-free stools in those treated with chenopodium than with thymol, and a few cases not clearing up under two or three thymol treatments responded to it. The whip worm (*Trichocephalus dispar*) seems especially resistant to the drug.

The value of chenopodium as an intestinal parasiticide being fully established, its use in the treatment of amebic dysentery was suggested to the earlier workers who have favorably reported on its use in a large number of cases. An apparently magical result has been obtained in a great percentage of cases treated, the amebæ disappearing from the stools in from the second to the fifth day and remaining absent throughout the usual period in which a relapse might be expected.

Chenopodium is a dangerous drug, and its application by persons not experienced in its use may result fatally. On the other hand, too much caution manifested by the administration of insufficient dosage may entirely defeat the result desired. A drop is not equivalent to a minim, and insufficient dosage is usually obtained by dispensing 16 drops as the equivalent of a mil. The factors governing the size of a

drop of this oil are varied, among which are the age and temperature of the drug, the size of the opening in the dropper, the column of oil in the dropper, and the angle at which it is held. In cases where a definite number of minims is to be dispensed the estimation of the average number of drops to a mil from a sample of the oil dropped from a selected dropper may be obtained to insure a practical element of safety and sufficient accuracy. In experimenting with a number of droppers we have found the number of drops to a mil to vary from 36 to 45. It is obvious, therefore, that the measured dose is the reliable and safe one.

The Bureau of Chemistry at Washington, through the experiments of Salant, Nelson, Livingston, and others, has conducted intensive pharmacologic investigations to determine as fully as possible the action of the drug in the hope that the results of their experiments would place its use on a more practical basis. They advise caution in dispensing the drug, as when taken internally it affects the central nervous system, the heart, respiration, digestive organs, and the kidneys. Its use is contraindicated in advanced cases of chronic nephritis and heart disease. They further believe that the liver plays an important part in detoxifying the drug and that abnormal changes in the gastric and intestinal mucosa may accelerate its absorption.

It may therefore prove more toxic in hepatic and gastro intestinal diseases. They have further established, through extensive experiments on animals, that the nutritional condition of the subject is a large factor in determining the toxicity of oil of chenopodium and that this also applies to the human subject. Oil of chenopodium should be administered with caution to the weak and poorly nourished.

The symptoms of poisoning by the drug are of gastrointestinal and neurotaxic type. The first is manifested by a sensation of heat and burning in the stomach and colicky intestinal pains, accompanied in some cases by nausea and vomiting. This type is usually mild, occurs quite frequently in dispensary practice, and is not of sufficient severity to cause alarm and usually passes off in a few hours. Such symptoms, however, are sometimes the forerunner of a severe poisoning, indicated by violent retching, purging, and collapse: death might ensue. The neurotoxic symptoms are tinnitus aurium, and numbness and tingling of the hands and fingers usually accompany the mild gastrointestinal symptoms. The more severe symptoms of the neurotoxic type are frontal headache, almost total deafness, general muscular weakness, and collapse, followed by a definite muscular incoordination, tetany, mental incoherence, delirium, convulsions, and coma. This group of severe symptoms appears on the second or third day and may not be accompanied by

any gastrointestinal symptoms. A pronounced spasticity of the intestinal musculature, as evidenced by a doughy, lifeless feeling of the abdomen, appears early. Peristalsis seems to be completely inhibited.

The administration of oil of chenopodium in castor oil is believed to minimize the danger considerably, and especially if followed within one or two hours by a large dose of castor oil. It is, at least, a good routine procedure in dispensary practice where a great proportion of the patients treated are weak and poorly nourished. Salant after an intensive study of the toxic effect of the drug on animals and in accord with the views of Hall and Foster, believes castor oil to be of great prophylactic value and strongly recommends its use. There is no chemical antidote for the drug, the treatment in cases of poisoning being symptomatic.

The case reported below took 11 measured mils of the drug in 20 mils of castor oil within two hours, 10 mils of which were administered at a single dose. Marked ringing in the ears and interference with hearing, a slight burning sensation in the epigastrium, an apparent inhibition of intestinal peristalsis, partial collapse, and slowing of the respiration and pulse occurred within 30 minutes after the ingestion of this dose of the drug.

L. L., sergeant, U. S. Marine Corps, reported at the sick bay in Managua on July 12, 1920, and was admitted to the sick list with a tentative diagnosis of amebic dysentery, which diagnosis was confirmed shortly afterward by observing motile *Entameba histolytica*, with ingested erythrocytes, in mucus from a specimen of a fresh stool. His temperature upon admission was 101° and he was passing 8 to 10 stools daily which contained considerable mucus and blood. Physical examination was negative with the exception of a slight loss in weight.

As observed above, oil of chenopodium in the treatment of amebic dysentery has been favorably commented upon and it was decided to use it in the treatment of this case. The medical officer, therefore, ordered the following: Oil chenopodium 10 minims and castor oil 10 mils, to be mixed and given two hours apart for two doses, repeating daily for three days. The bowels were emptied the night before by the administration of an ounce of castor oil and proper dietary routine was established. The ward routine called for the chenopodium to be given at 6 and 8 a. m., followed at 10 a. m. by an ounce of castor oil.

On the second day of the treatment the man in charge of the ward gave the first morning dose at 8 a. m., and being occupied with sick-call routine, ordered his assistant, a hospital apprentice and a novice in the service, to give the treatment, verbally informing him of its

composition. The hospital apprentice, mistaking minims for mils, carefully measured out 10 mils of oil of chenopodium and a like amount of castor oil, mixed the medicines, and gave it to the patient. After completing sick call at 8.45 the medical officer, while making rounds in the ward, noticed that a grave change had come over the patient. He appeared greatly prostrated, had an anxious facial expression, and was perspiring profusely. He stated he felt all right until "that last dose of medicine." His body was bathed in cold perspiration, the pupils moderately dilated, but reacted to light and accommodation; the pulse was soft and compressible with a rate of 60 to the minute. The respiration was shallow with an apparently forced inspiratory effort; its rate was 11 to the minute. The patient was fully oriented and conscious. The reflexes were normal, but he complained of ringing in the ears, which interfered with hearing. The lips and tongue were dry; the temperature was 97.4 F.

It was at once surmised that the patient was either manifesting an idiosyncrasy to the drug or had been given an overdose. The hospital corpsmen concerned admitted their error; the hospital apprentice stating that he gave the patient by mistake 10 mils of the drug, or the same amount as of castor oil, and produced a 10 mil graduate in which it had been measured. As the condition of the patient was rapidly approaching a state of general collapse, camphor in oil and adrenalin were given at once by hypodermic and digitalin and strychnin ordered to be given every six hours as a routine stimulant. An ounce and a half each of olive and castor oils were given and external heat applied. A high rectal injection of 8 ounces of olive oil was given and retained 2 hours. The response to the above measures was prompt, the pulse attaining a rate of 72 to the minute and becoming of good volume; at the end of an hour the respiratory rate was 20 to the minute, with considerable improvement in the respiratory excursion. Tinnitus aurium increased rapidly; the pupils were more dilated and less sensitive to light; the patient was more restless. A high soapsuds enema gave a clear return which contained many oil globules and an odor of chenopodium. Three hours later the patient became semistuporous, though he could be aroused, when he recognized attendants, but was quite deaf, hearing only the loudly spoken voice close to the ear; prostration to a marked degree persisted.

During the first day the patient was given by mouth 16 ounces of nutriment (cereal and albumin water) and 5 ounces of water. He swallowed with difficulty, however. No urine was voided. The second, third, and fourth days witnessed the patient passing into a marked stupor from which he could not be aroused. Deglutition became even more difficult and a complete intestinal stasis intervened.

The entire abdomen, though not presenting a definite muscular rigidity, was retracted (scaphoid), doughy, and felt lifeless. The legs and feet were extended and resistant when an effort to flex was attempted: the hands were partially flexed at the wrist, the fingers flexed at the metacarpo-phalangeal joints, the phalanges extended, and the whole hand drawn toward the ulnar side with the flexed thumb adducted on the palm, the typical accoucheur's hand of tetany. A meningismus appeared at this time. The ocular reflexes were more sluggish, the pupils slightly unequal: the skin dry and warm, the rectal temperature being 103.2 F., having gradually risen during the past three days from the initial temperature of 97.2°. The voluntary output of urine on the second and third days averaged 650 mils for each 24 hours. Also, on the third day small particles of well-formed fecal matter were recovered from the return of a high soap-suds enema. The respiration and pulse were precarious, the breathing extremely shallow and accompanied by a gasping inspiratory effort, with an alarming pause between excursions: the pulse was irregular and weak.

Late in the afternoon of the fourth day the patient had flights of active delirium, the temperature reached its highest point (103.2 F.), and involuntary urination and defecation occurred. The most critical stage of cardiac and respiratory failure took place at this time. Rapidly diffusible stimulants, as ether, camphor, adrenalin, and ammonia, were resorted to in addition to routine stimulation with digitalin and strychnin. Saline by rectum (Murphy drip) was started at this time and continued throughout each day, with proper intervals of rest, for seven days, the average daily retention of 3,000 mils being recorded. The urinary output continued satisfactory. The patient was given by mouth a daily average of 31 ounces of nutriment (eggnog with whisky, rich soups, cereal, and albumin waters) and 35 ounces of water. Due to difficult deglutition the greatest patience was required in giving nutriment and water by mouth.

On the fifth and sixth days the patient's delirium was of a maniacal type, and it was necessary to forcibly restrain him: he suffered hallucinations of persecution by the attendants and would attempt to attack them. Opiates had little effect on this condition.

A general collapse was feared throughout the whole of the seventh day, as the patient was rapidly becoming exhausted by constant struggling during the height of his delirium. The prognosis became exceedingly grave. Later in the day the delirium passed into that of the muttering type with a marked increase in the character of the tonic spasms (tetany) of the muscle groups involved, accompanied by a definite and pronounced retraction of the neck and spasm of the neck muscles. The respiration was extremely shallow and inter-

rupted by a forcible inspiratory effort, though cyanosis was not present; the pulse was slow, weak, and irregular.

On the eighth day the patient was more quiet, but could not be aroused. Some improvement occurred in the character of the pulse and respiration; water and nutriment intake was as usual. The patient involuntarily voided 1,250 mils of urine and passed a brown, semiformed stool. His restlessness increased later in the day, but he was not violent and he enjoyed intervals of complete quiet and appeared to sleep.

Consciousness returned on the ninth day, though his mentality was decidedly hazy and delusions and hallucinations, though of a milder character, persisted. He did not recognize attendants, but asked for food and complained of a severe ringing in the ears. He was quite deaf, apparently barely hearing the loudly spoken voice close to the ear. He would answer questions in an irrational manner and persistently maintained that the barracks was a battleship. Tetanic (tonic) spasm of the muscles was not marked, though still could be recognized; there was no change in the character of the meningismus. One thousand mils of urine and a well-formed stool were passed during the day.

On the tenth day the patient's consciousness fully returned, though he was mentally confused; tetany completely disappeared, though the meningismus persisted; all of the reflexes approached normal; urinary and fecal output became normal and voluntary. He took water and nourishmment readily, as a liberal soft diet was started at this time. The patient's mentality and general condition rapidly improved, though tinnitus and partial deafness persisted for some time.

Daily examinations of the urine failed to reveal the slightest evidence of albumin, blood, or other destructive kidney changes. Examination of stools before the poisonous dose of chenopodium had been given showed several very sluggish ameba with considerable degenerative changes. Stools subsequently examined did not contain ameba, mucus, or blood. Examination of a formed specimen on the thirteenth day, as well as weekly examinations for the past 10 months, have not revealed ameba. The ringing in the ears rapidly passed away and the hearing became fully normal at the end of the fourth week. Unfortunately, blood-pressure observations were not made during the course of the patient's illness. At this writing, 10 months later, the patient's mentality is fully normal and his general condition excellent.

REFERENCES.

(1) Salant, W., Jour. Am. Med. Asso., December 15, 1917.
(2) Hall, M., and Foster, W., Jour. Am. Med. Asso., June 30, 1917.

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BRUSHING THE TEETH.

By H. E. Harvey, Lieutenant Commander, Dental Corps, United States Navy.

The majority of toothbrushes exhibited for sale, and consequently the majority in use, are too large for efficiently brushing the teeth.

A moment's reflection will convince the thinker that the tooth surfaces ordinarily cleansed by the tongue, cheeks, and by the food during the process of mastication are the ones least in need of scouring with a brush, yet these surfaces are the only ones ordinarily reached when using a large brush in an indifferent manner.

A large percentage of all individuals are inflicted with pyorrhoea when middle adult life is reached and passed, and therefore a method of brushing the teeth which also brushes and massages the gums is an important factor in the prevention of this disease.

A very common error is that which holds bacterial invasion as the cause of pyorrhoea, but to quote from the report of a committee of the American Academy of Periodontology on case management:

"Lowered resistance of periodontal tissues to disease is caused by the action of one or more etiological factors, those most commonly present being traumatic occlusion and any of the local conditions causing irritation and favoring the collection of débris, with its attendant bacterial growth.

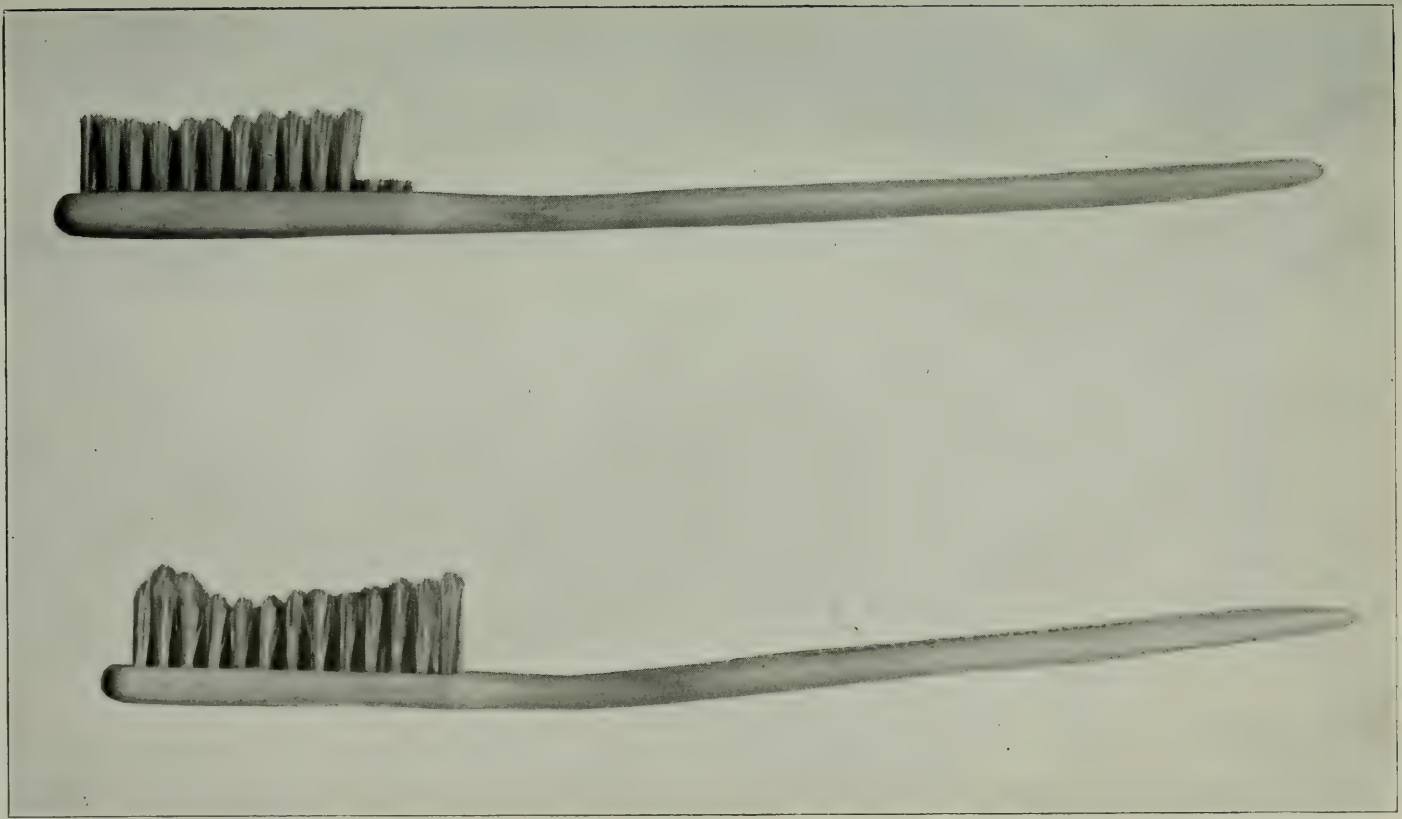
"The bacteria responsible for the infection are secondary etiological factors and determine the type of disease. Invasion of the periodontal tissues by normal mouth flora depends wholly upon tissue conditions.

"It is believed that in 90 per cent of cases lack of tissue resistance can be corrected by removing the local causes of irritation and inflammation, that is, by eliminating the most commonly present primary and secondary factors, such as traumatic occlusion and local conditions favoring the collection of débris, detritus, and microorganisms.

"The greatest safeguard to tissue resistance against microorganic infections are high tissue vitality, absence of local irritants, and the reduction of the microorganisms to the fewest possible number."

While it is the dentist's province to remove the local irritants and correct traumatic occlusion, it is incumbent upon the individual to reduce the microorganisms to the fewest possible numbers and to keep the vitality of the tissues as high as possible, and it is here that the correct brushing of the teeth and gums has such an important bearing.

Various types of small brushes are obtainable on the market, but as it is impracticable to have the ship's store carry a special type, the following modification of the prophylactic brush is suggested as a means of obtaining a small brush wherever the latter can be had. With a pair of small scissors or a knife cut off the six tufts of bristles nearest the handle (two rows of three each) and then lessen the length



THE PROPHYLACTIC TOOTH BRUSH AS PURCHASED AND AS MODIFIED BY TRIMMING THE BRISTLES.

of the end tuft by cutting it almost even with the remainder of the nearest bristles. This gives a brush of about the dimensions recommended by a committee of the American Academy of Periodontology, and one small enough to easily reach all parts of the mouth. This size brush used in connection with the rolling method of brushing the teeth gives an efficient combination for cleansing the teeth, clearing the interdental spaces, and massaging the gums, the latter promoting circulation in the parts.

Perhaps no better instructions can be given than the following quotation: "Use a small brush. Brush the gums and teeth. Be sure and reach both sides of the rearmost molars."

TO BRUSH THE TEETH.

"Place the toothbrush, ends of the bristles up for the upper teeth, between the cheek and the gums; turn the brush toward the gums, sweeping the bristles down over the gums and teeth to the cutting edges of the teeth. Reverse for the lower teeth and brush up.

"This motion brushes the cheek side of all teeth and the tongue side of the back teeth.

"Brush the inside of the front teeth by putting the brush, bristles up, on the roof of the mouth for the upper teeth and on the floor of the mouth for the lower teeth and pulling the brush outward over the gums and teeth.

"Brush the grinding surfaces of the teeth with an in-and-out and side-to-side stroke of the brush.

"Rinse the brush in clear water frequently while brushing the teeth and hang it up to dry when not in use.

"A tooth powder, paste, or a solution of common table salt may be used as a dentifrice once each day. Use clear water at other times."

It is essential that a stiff brush be used and vigorous motions be made, using the forearm. The final brushing may be completed by a light brushing with a long circular motion over all surfaces of the teeth. Dental floss should be used as routine for cleansing spaces under bridges and between the teeth. The final step should be that of taking in the mouth a small quantity of water and with the teeth closed forcing the water with the cheeks and tongue back and forth through the interdental spaces.

TWENTY-EIGHT CASES OF PNEUMONIA.

By J. R. Jeffrey, Lieutenant, Medical Corps, United States Navy.

The pneumonia situation for the winter of 1920–21 at the United States Naval Training Station, San Francisco, Calif., consisted of a mild or small epidemic which extended from January 30 to February 15, during which period 16 cases were admitted. The balance of the cases were sporadic and were admitted in the period from Decem-

ber 25, 1920, to April 2, 1921, with the exception of the cases mentioned above. Considering that the average complement of the station was over 5,000 men this gives an admission rate of less than one-third of 1 per cent for the epidemic period and about one-half of 1 per cent for the entire season.

The 28 cases consisted of 27 lobar pneumonias and 1 broncho-pneumonia. The single case of broncho-pneumonia gave a history of having had duty indoors in the stencil room and of sleeping in a warm room preceding the onset of the disease. All but two of the lobars gave histories of having guard duty, drilling or other outside details, and of sleeping in tents. During the season the weather had been rainy or foggy for a quarter part of the time and very little opportunity was offered for airing bedding or drying out tents. It is surprising that the percentage of pneumonias is so low considering the large number of admissions for acute bronchitis and that two-thirds of the men on the station were recruits and many of them from the warm Southern States.

Although this series of cases is too small to give any except comparative data, some very interesting points have been noted.

Seventy-five per cent of the cases were well prior to the onset of the disease. Three of the cases developed in sick quarters, one 8 days and another 18 days after being admitted with acute bronchitis and one mild case three weeks after being admitted with acute laryngitis.

Thirteen (48 per cent) had involvement of the right lung, 11 (40 per cent) of which were of the lower lobe and 2 (7.5 per cent) were of the lower and middle lobes. Fourteen (52 per cent) were of the left side and only the lower lobe was involved. In none of the cases were both lungs affected.

The following table gives the data as to types:

Lung.	Type I.	Type II.	Type III.	Type IV.	Not typed.	Total.
Right	3	2	2	5	1	13
Left		1	1	9	3	14
Total	3	3	3	14	4	27

Both cases in which two lobes were affected were Type I.

One case had a reinvolvement of the same lobe 14 days after his temperature had reached normal by lysis and ran a typical course with a crisis on the third day.

Three patients had attacks of malaria while convalescing. Two responded readily to quinine treatment, but the third required neoarsphenamin intravenously before the chills were controlled after which he gained very rapidly.

One case of delayed resolution was found that later developed into an abscess which subsequently ruptured and drained through a bronchus. Following the initial rupture he raised a pint and a half of pus within a half hour, which on laboratory examination showed many streptococci and Type I pneumococci.

Nine cases developed suppurative pleurisy, and rib resection was done as soon as the diagnosis was established on eight of them. The ninth case was drained through a silver tube inserted through a stab wound on account of the presence of a pneumothorax. The time of development of the suppurative pleurisy varied from 12 to 23 days after the original admission and from 3 to 10 days after the temperature had reached normal by crisis or lysis. In three cases the temperature did not drop to normal before the complication was diagnosed.

The temperature fell to normal by crisis in 13, and by lysis in 9 cases.

The mortality was three cases (11 per cent). One died of toxemia on the fourth day, the second of acute dilation of the heart on the fifth day of the disease, and the third a suppurative pleurisy with pneumothorax a week after transfer to the Mare Island Hospital and 60 days after the original admission.

In only one case was an albuminuria found and that in the case which subsequently died of toxemia.

One case of chronic pulmonary tuberculosis was discovered 15 days after the patient had been up and about in the ward. He gave a history of tuberculosis in mother and two sisters who had died in the past two years with this disease.

Mitral systolic murmurs were found in two cases, which disappeared after the termination of the pneumonia. One of these was in a case which had had an acute laryngitis for three weeks prior to the onset of the pneumonia and was probably due to a vagus involvement associated with the laryngitis.

Two of the patients did not raise sufficient sputum for typing and even during their convalescence coughed very little.

The leucocyte count varied from 8,000 to 38,500 on admission, and in several the count did not reach 10,000 till after the crisis. Of the seven cases where the count ran above 25,000 on admission and till after the crisis, five developed complications.

The treatment was purely symptomatic. No serum was used. In two cases whisky was used as a stimulant for short periods. Two patients required digitalis for three-day periods. Creosotal minims X t. i. d. was used as a routine on the last 10 cases and seemed to give some relief. Dover's powders, codeine, and morphine were given freely where needed to control the coughs and as a hypnotic.

The assembled data are given in the following table:

DATA OF ALL LOBAR PNEUMONIA CASES, WINTER (COOL, WET) SEASON, 1920–1921.

U. S. NAVAL TRAINING STATION, SAN FRANCISCO, CALIF.

Cases.	Rate.	Age.	A-RA.	Date.	Lobes involved.	Type.	Admission. T.	P.	R.	Urine.	W. B. C.	Crisis or lysis.	Complication or associated disease.	Days after admission.	Aspirations.	Operation.	Disposition.	Remarks.
1	A. S.....	19	A.....	Jan. 14, 1921	Rt. L. M.	I.....	104	104	22	Neg..	36,000	L-10..	Pleurisy, supp.	13	3	Rib resected.	T-31...	
2	Cox.....	18	R. A..	.....do.....	Lt. L....	IV.....	102.5	126	22	Neg..	8,000	C-5..	None.....	.....	.....	.....	D-25...	Received from T. S. S. Bath.
3	A. S.....	18	A.....	Jan. 17, 1921	Rt. L ...	III.....	102.5	86	22	Neg..	25,000	L-8..	Reinvolvement of same lobe after 22 days.	22	.....	.....	D-52...	Reinvolvement 14 days after lysis.
4	A. S.-El. (R).	18	A.....	Jan. 20, 1921	Rt. L ...	Not typed.	101	102	24	Neg..	.....	L-10.	Pleurisy, supp.	16	1	Rib resected.	T-25...	
5	Bkr-2...	22	R. A..	Dec. 25, 1920	Lt. L....	...do.....	103	112	24	Neg..	38,500	C-5..	None.....	.....	.....	.....	D-38...	Received from receiving ship San Francisco.
6	A. S.....	18	A.....	Jan. 30, 1921	Lt. L....	.....	103	94	24	Alb..	12,740	.....	.....	.....	.....	.....	DD-4..	Toxemic death no sputum for typing.
7	F-3.....	18	A.....	Jan. 31, 1921	Lt. L....	IV.....	102	88	22	Neg..	18,400	C-6..	None.....	.....	.....	.....	D-29...	
8	A. S.....	18	A.....	Feb. 1, 1921	Rt. L....	IV.....	102	88	34	Neg..	.....	C-3..	.....do.....	.....	.....	.....	D-28...	
9	F-3.....	20	A.....	Feb. 4, 1921	Rt. L....	IV.....	102	132	36	Neg..	.....	.....	.....	.....	.....	.....	DD-5..	Died of acute dilation of heart.
10	A. S.....	21	A.....	.....do.....	Rt. L....	II.....	103.5	120	22	Neg..	12,600	C-3..	None.....	.....	.....	.....	D-25...	
11	S. C.-2..	33	R. A..	Feb. 6, 1921	Lt. L....	IV.....	101	94	19	Neg..	8,200	C-3..	.....do.....	.....	.....	.....	D-23...	Received from receiving ship San Francisco.
12	A. S.-Y..	25	A.....	Feb. 8, 1921	Rt. L. M.	I.....	104	96	24	Neg..	7,300	C-8..	Delayed resolution, malaria abscess of lung.	.....	1	.....	T-52...	
13	A. S.....	18	A.....	Feb. 9, 1921	Rt. L....	IV.....	103	90	24	Neg..	27,700	C-4..	None.....	.....	.....	.....	D-21...	
14	A. S.....	17	A.....	Feb. 10, 1921	Lt. L....	LV.....	104	106	28	Neg..	21,500	L-9...	Malaria, pleuritic adhesions.	.....	.....	.....	Convalescent.	
15	A. S.....	23	A.....	Feb. 9, 1921	Lt. L....	IV.....	103	90	24	Neg..	37,000	C-9..	Mumps, pleurisy supp.	12	2	Rib resected.	T-21...	Developed mumps eleventh day.
16	F-3.....	21	A.....	Feb. 13, 1921	Rt. L....	IV.....	102	110	22	Neg..	30,400	C-5..	Pleurisy, supp.	15	2	....do.....	T-24...	Pseudocrisis third day.
17	A. S.....	19	A.....	Feb. 3, 1921	Rt. L....	IV.....	104	120	22	Neg..	9,800	No .[1]	Pleurisy, supp. pneumothorax.	.....	4	Drainage through stab wound.	T-55...	Silver tube inserted through wound after 41 days.[2]

18	A. S.....	17	A.....	Feb. 12, 1921	Lt. L...	II.....	102	90	24	Neg..	.....	No.[1]	Pleurisy, supp.	21	2	Rib resected.	T-27...	
19	Sea-2.....	17	A.....	Feb. 15, 1921	Lt. L...	IV.....	103.5	108	34	Neg..	36,600	C-13	.....do.....	23	2	....do.....	T-29...	
20	A. S.....	20	A.....	Feb. 6, 1921	Rt. L...	III.....	102	108	28	Neg..	15,200	No [1]	.....do.....	15	1	....do.....	T-24...	
21	A. S.....	17	A.....	Feb. 9, 1921	Lt. L...	IV.....	103	98	22	Neg..	8,000	L-5..	.....do.....	12	1	....do.....	T-21...	Admitted Jan. 21, 1921, account bronchitis.
22	A. S.....	18	A.....	Feb. 25, 1921	Lt. L...	Not typed.	100.8	70	36	Neg..	.....	L-5..	Laryngitis, valvular disease, chr. cardiac.	.....	.....	.....	D-31...	
23	A. S.....	21	A.....	Feb. 28, 1921	Lt. L...	III.....	103.5	142	26	Neg..	9,200	L-16.	.....	.....	1	.....	Convalescent.	
24	A. S.....	18	A.....	Mar. 1, 1921	Rt. L...	I.....	103.5	100	24	Neg..	24,750	C-5..	.....	.....	.....	.....	....do...	
25	A. S.....	20	A.....	Mar. 9, 1921	Lt. L...	IV.....	105	115	20	Neg..	13,750	C-6..	T. B., chr. pul.	38	.....	.....	D. A. 38 T-4.	
26	A. S.....	18	A.....	Mar. 17, 1921	Lt. L...	IV.....	103	120	24	Neg..	15,100	L-4..	Malaria.....	.....	.....	.....	D-37...	
27	S-2.....	19	A.....	Apr. 2, 1921	Rt. L...	II.....	103	108	30	Neg..	20,500	L-12.	.....	.....	.....	.....	Convalescent. D-38.	

[1] Temperature had not reached normal when transferred.

[2] Ultimately died at Mare Island.

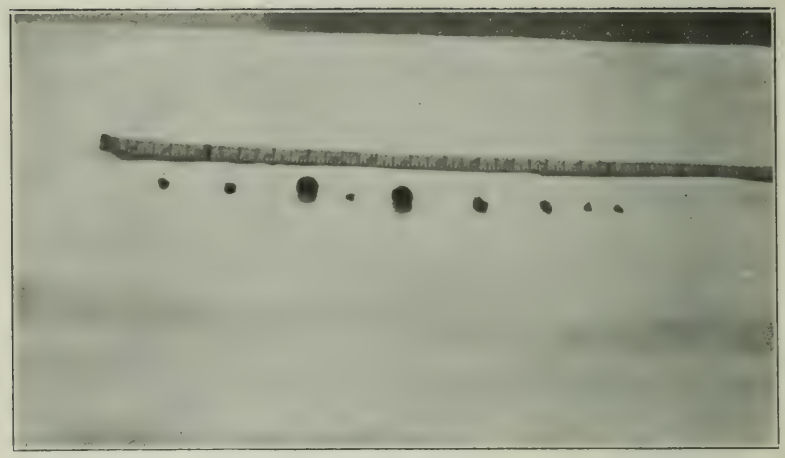
A CASE OF TUBERCULOUS MENINGITIS.

By S. P. Taylor, Lieutenant Commander, Medical Corps, United States Navy.

F. R. B., apprentice seaman, U. S. Navy, age 18 years, was admitted to the United States Naval Hospital, Gulfport, Miss., from the main training camp dispensary February 12, 1921. His family history was negative. He had had measles, mumps, smallpox, and malaria in childhood.

Upon admission to the hospital, the patient stated that he had had for the past 10 days a severe orbital and occipital headache. This headache had been getting constantly worse and nothing seemed to give relief. He had projectile vomiting twice in the last three days.

His temperature on admission was 99.6 F., pulse 52, and respiration 20. He had the facial expression of one in severe pain. He was extremely restless, and it was difficult to keep him in bed. His chief complaint was this severe headache. Physical examination showed an alert, fairly well-developed boy eighteen years of age. There was slight stiffness of the neck muscles, and the patella reflexes on both sides were absent. The ocular movements were normal. The pupils were dilated, equal, and reacted to light and accommodation. There was no Kernig, no ankle clonus, and no Babinski. Examination of the heart, lungs, and abdomen revealed no abnormality. The leucocytes in the blood were 12,000 per c. mm., and the urine was negative. Lumbar puncture was performed on admission, and 30 c. c. of clear spinal fluid was removed under slightly increased pressure. Examination of the fluid showed 450 cells per c. mm. The differential count was 94 per cent small lymphocytes, 2 per cent polymorphonuclear, and 6 per cent large mononuclear leucocytes. A stained smear of the spinal fluid was negative for the meningococcus and the tubercle bacillus; 24 and 48 hour cultures of the spinal fluid on blood agar and plain agar were sterile; Pándy, Ross-Jones, and Fehling's reactions were negative. Cerebrospinal fever, cerebrospinal syphilis, tuberculous meningitis, and other secondary forms of meningitis were considered as possibilities. Cerebrospinal fever was eliminated by the high percentage of small lymphocytes in the spinal fluid and the low percentage of polymorphonuclear leucocytes. The meningococcus could not be found in smears of the spinal fluid, and cultures for the meningococcus were negative. The spinal fluid in cerebrospinal fever is apt to be cloudy, and in this case it was perfectly clear. Other forms of meningitis due to pneumococci, etc., are also distinguished by their spinal fluids, which are usually cloudy, and the staining of the spinal fluid will show the infecting organism. The spinal fluid in this case showed no organisms on slides stained with methylene blue, and cultures both on plain agar and blood agar were negative.



GALLSTONES.

RENAL STONES.

Cerebrospinal syphilis was eliminated by a negative Noguchi on the blood and spinal fluid and a normal Lange colloidal gold curve.

Tuberculous meningitis seemed the most probable diagnosis in view of the fact that the spinal fluid was clear, sterile, and the cell count showed 750 cells per c. mm., 94 per cent of which were small lymphocytes. February 14 the patient still complained of headache, the stiffness in the neck increased, and the vomiting recurred. He was semiconscious all day. His temperature was 100 F., pulse 52, respiration 20.

On February 15 there was complete retention of the urine. By lumbar puncture 30 c. c. of spinal fluid was removed under pressure. Examination of this fluid showed 750 cells per c. mm., 92 per cent lymphocytes, 7 per cent polymorphonuclears, and 1 per cent mononuclears. Smears, many of which were made, were negative for the tubercle bacillus. A test tube containing 10 c. c. of the spinal fluid was set aside for 24 hours. The pellicle of fibrin which had formed in the center of it was fished out and spread upon slides which were stained for the tubercle bacillus. Nearly every microscopic field showed two or more tubercle bacilli, which made the diagnosis of tuberculous meningitis, and the case is reported because of the success of this procedure.

The patient steadily failed and died February 19, 1921. Necropsy was performed. On opening the dura a small amount of straw-colored fluid escaped. Upon the pia mater and arachnoid at the base of the brain were many grayish miliary tubercles most numerous along the blood vessels and in the interpeduncular space. The peribronchial lymph glands were enlarged. The lungs showed no evidence of any tuberculous lesions. Many cut sections were made of all the organs, yet no evidence of tuberculosis could be found. Microscopic examinations of the sections from the lungs, bronchial lymph glands, and kidneys showed no evidence of tuberculosis.

CHOLECYSTECTOMY AND PYELOTOMY IN GUAM.

By A. H. Robnett, Commander, Medical Corps, United States Navy.

The two following cases occurred in the surgical service of the United States Naval Hospital in Guam.

Case I. Cholecystectomy.—1. B., female, aged 23, married, the mother of five children. She gave a history negative for typhoid, pneumonia, or any other prolonged illness. She had the usual diseases of childhood, since which time her health has been excellent.

For several years at intervals she has had colicky pains in the epigastrium. While pregnant this pain would disappear and did not return until after being delivered. About six months prior to

admission to the hospital she ate some canned oysters for dinner. During the night she awoke with colicky pains in the region of the epigastrium and the right hypochondrium. Shortly after arising the pains disappeared. (The oysters were credited with causing them.) Since that time, often in the early morning hours, she would be awakened with these pains, which disappeared shortly after arising from her bed. A week before admission these colicky pains were present each night and became more severe and persistent. She was put to bed in the hospital on Ochsner's treatment for appendicitis and the day following she felt relieved. Temperature, pulse, and respiration were normal and the white-blood count was 7,600. There was no jaundice. In the evening, after being up nearly all day, the intense pain returned and she was given morphine to relieve it; next morning it was decided to do an exploratory laparotomy at once.

OPERATION.

Right rectus incision. The appendix was found to be very long and bound down by a Jacksonian membrane. The appendix was removed. The ovaries and uterus were normal. The gall bladder was distended and several stones were palpated. The incision was extended. The patient did not take the anæsthetic well, so speed became an element for consideration. As the gallstones were easily returned to the gall bladder, cholecystectomy was decided upon. The neck of the gall bladder was transfixed with double ligatures and the gall bladder, containing four large stones, was removed. A rubber drain was placed at the stump of the gall bladder and the abdomen was closed. There was marked reaction to the operation, the temperature rising to 103 F. for three days. The blood picture remained practically normal. On the fourth day the drain was removed and convalescence was uneventful. She was discharged from the hospital well on the seventeenth day. The gallstones, measuring 1 inch in diameter, were round and too large to be passed through the common duct, but while the patient was in the recumbent position they would fall into the neck of the gall bladder and in this way give rise to the pain coming on after retiring. Upon the patient's arising in the morning, these gallstones would fall to the most dependent part of the gall bladder and thus relieve the pain.

LABORATORY EXAMINATION.

The bile from the gall bladder was negative for microorganisms, and there was no growth on the culture media. Two stones were crushed, culture taken, and penumococcus was found on growth.

The interesting points in this case are: Absence of jaundice; no symptoms of gall-bladder trouble other than pain in abdomen; complicated appendix with Jacksonian membrane; size of the gall-

stones, which would never have been able to pass through the common duct, making their ultimate removal a necessity, and the recurrence of the attacks while in the recumbent position and their disappearance on rising.

Case 2. Pyelotomy.—M. G. T., female, aged 28, married, was four months pregnant (primipara). Her previous medical history revealed scarlet fever, bloody urine, measles, and pertussis during childhood. She had influenza two years ago. In 1913 she began to have pains in the right lumbar region. These pains have continued at intervals ever since. Any shaking, as riding in a cart or automobile, would bring on the pain. During her menstrual periods the pain was more pronounced.

Three weeks before admission to the hospital she had excrutiating pain in the right lumbar and iliac regions during the passage of a renal stone to the bladder, it being later voided through the urethra. This stone measured one-fourth inch in thickness and one-half inch in length. She came to the hospital for examination and measurements relating to her pregnancy, mentioned the pains in her right lumbar region, and produced the stone she had passed.

Physical examination showed her to be well nourished, four months pregnant, kidneys palpable. Urine and blood examinations were negative. X-rays showed the right kidney to be very large, with two fair-sized stones in the pelvis. The left kidney was negative. Patient being in good condition, immediate operation was decided upon.

OPERATION.

The extraperitoneal route was chosen. The kidney was delivered outside of the body with difficulty. It was found to be enlarged, but of normal structure, although the capsule was very adherent to the surrounding tissue, making it necessary to strip it to deliver the kidney, causing some local hemorrhage. The stones were located in the pelvis, a longitudinal incision was made in the pelvis of the ureter, the stones were seized with forceps and delivered. They were very large, one being 1½ inches long, 1 inch wide, ¾ inch thick. The others were smaller, as shown in the X-ray. The pelvis of the kidney was very much enlarged. The ureteral incision was closed and reinforced with Lembert's stitches. Remnants of the capsule were removed, the kidney was replaced with a drain leading to the pelvis, and the kidney fat sutured. The wound was closed, and on the fourth day the drain was removed, when there was a noted discharge of bloody urine by both bladder and wound. On the sixth day all the urine and the discharge from wound was clear. There was slight reaction to the operation. On the eighteenth day the discharge of urine from the sinus ceased and the wound healed. The patient was allowed to

go to the toilet and to recline in a chair. On the twenty-first day she was discharged cured. The pregnancy was not disturbed.

The interesting points in this case are: The immense size of one of the stones, no apparent damage to the kidney parenchyma, no interference with pregnancy, lack of marked reaction following operation, and the prompt closing of the sinus with lack of any kind of infection.

ELEPHANTIASIS OF THE SCROTUM.

By L. W. Breene, Lieutenant, Medical Corps. United States Navy,[1] and W. Zur Linden, Chief Pharmacist, United States Navy.[2]

During November, 1920, while cruising in the West Indies, the U. S. S. *New Hampshire* visited the small port of Gonaives, Haiti, where the medical officer was asked by the sanitary officer of the port to see some cases in the civil hospital and in the Gendarmarie prison. The patient, who is the subject of this report, a prisoner, had an immense enlargement of the scrotum which hindered his walking. He was a negro, very ignorant, and apparently about 45 years of age. He was greatly emaciated, probably from lack of sufficient food. He was much depressed and had twice attempted suicide.

No reliable history of his condition could be obtained. He told us that about 25 years ago he was bitten on the scrotum by an insect, and he dates his trouble from that event. The enlarged scrotum was estimated to weigh 50 pounds. The accompanying illustrations make detailed description superfluous. Urine was voided through an ulcerated aperture opening anteriorly. Operation was performed under ether.

A tourniquet was placed around the mass, as close to the base as possible: a dorsal slit was then made down to the penis. That organ was found intact and normal except for the fact that it was 15 inches in length, caused by prolonged tension due to the weight of the mass. The right testical was normal, but the left was atrophied and contained a hydrocele. It was removed. Bleeding was severe and troublesome in spite of the tourniquet. All of the hypertrophied cellular tissue possible was removed, and then, by a series of circular sutures, the penis was reduced to about 8 inches in length, and covered with skin. Hemorrhage was controlled, and the patient left the table in good condition.

He voided urine in the dressing during the night, and the next day he used the urinal. The recovery was a stormy one. Infection set in about the fourth day and proved to be most difficult to combat. Recovery was complete after three months; and the man is now able to assume a useful occupation.

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[2] Sanitary officer, Gonaives, Haiti.

ELEPHANTIASIS OF SCROTUM. BEFORE AND AFTER OPERATION.

RULES FOR MASSAGE.

By W. S. Bainbridge, Commander, Medical Corps, United States Naval Reserve Force.

In a special number of the United States Naval Medical Bulletin published in January, 1919, certain directions for massage, devised by Captain W. H. Brood, R. A. M. C., in charge of the massage and gymnast departments of the Alder-Hey Hospital, Liverpool, England, were printed. These rules for massage had proved so useful and were so admirably explicit, for those beginning work in physiotherapy as well as those familiar with the procedure of that branch of treatment, that it seemed at that time that a copy of them put into the hands of all our nurses and aids employed in this work would be a distinct advantage. Many requests for these rules have been received, and as the special number in which they appeared is now out of print it is believed that a reprinting of them might be acceptable to the readers of the Bulletin.

Preliminary.—It is essential in every case for which massage is ordered that the masseur or masseuse, to whom the work is intrusted, should have a clear knowledge of the nature and extent of the injury, and also of the methods by which recovery is to be obtained. This is especially necessary in orthopedic cases. Consequently, an examination of the patent is made by the officer in charge of the massage department in the presence of the masseur or masseuse who is to undertake the case. A history of the case is taken on this occasion, with a detailed description of the present condition, movements, electrical reactions, and angles of affected joints. The X-ray photographs should also be examined when they are available, and the nature and object of any operation that may have been performed should be understood.

The officer in charge then suggests the particular massage movements suitable for the case, and, where joints are involved, the extent and degree of manipulation advisable. Any abnormal condition of a patient occurring during treatment should be reported immediately to the officer in charge.

After the orthopedic surgeon has effected structural repairs or alterations, it is massage which can assist in restoring function as far as restoration is possible.

It is a privilege to have the opportunity of assisting in this restoration to health, activity, and usefulness of our wounded soldiers. The massage department of a military orthopedic hospital presents this opportunity as perhaps no other does; therefore, let the treatment and progress of each case be regarded with the keenest personal interest.

Lubricants.—Effective massage is impossible in the majority of cases without the use of a lubricant. The object of a lubricant is to make manipulation easy, to prevent chafing of the skin, or dragging of hairs. What lubricant is used is immaterial as long as this object is attained. The slightest chafing or bruising of the patient's skin during treatment is inexcusable and is evidence of faulty technique. Ordinarily French chalk or one of the talcum preparations is used, but where there is a considerable growth of hair, trophic changes, or an unusually dry skin an oily material, such as olive oil or white vaseline, is indicated. The virtue of massage lies not in the lubricant but in the manual dexterity employed.

Muscle cases.—It is essential that a paralyzed limb should not be allowed to lie in a position in which the affected muscles are stretched, allowing the undisputed antagonism and possible contraction of the opposing healthy muscles. A normal, healthy muscle, even when at rest, is in a condition of slight contraction in order to respond instantly to an impulse. This condition of "tone" is absent in a paralyzed muscle. Paralyzed and weak muscles are kept from being stretched and elongated by a support applied to the affected limb. For example, a hyperextension wrist splint is worn in a case of musculo-spiral paralysis, a rectangular foot splint where the flexors of the ankle are weak, and abduction shoulder splint for a paralyzed deltoid muscle. The necessary massage can often be done in these cases without removing the supporting splint, but when its removal is essential the limb must instantly be passively supported by a pillow or sandbag as the splint is withdrawn to prevent any stretching of the affected muscles.

Heavy tapôtement, or percussion, movements should never be performed upon paralyzed or wasted muscles, as the attenuated muscles and weak nerves are easily injured. The gentlest petrissage, or muscle kneading, should be used, increasing in vigor as recovery proceeds.

Petrissage is best performed with the muscles or group of muscles in a relaxed and supported position. To illustrate this, when working upon the extensors of the forearm, the patient's wrist should be "dorsi-flexed," with hand and fingers supported on a sandbag to secure relaxation of the muscles. In the case of the flexors of the forearm the hand must be "palmar-flexed" to secure similar relaxation. Relaxation of the quadriceps may be procured by placing a large pillow or sandbag behind the knee. A similar pillow will also be found useful to secure semiabduction or semiadduction of the various joints where muscular relaxation is required.

Joint cases.—All passive movements should be performed by firmly grasping the limb just above and just below the joint. The necessary movements are made slowly, gradually, once only, and up to a point just short of giving pain.

Body weight will assist to immobilize the pelvis while the hip joint is moved.

Force is sometimes required to obtain additional movement of a joint, but should only be used when especially ordered by the officer in charge.

Pain, heat, swelling.—Any abnormal condition occurring in a joint, such as pain, heat, or swelling, should be immediately reported.

Bandages or splints which have been removed during massage should be carefully replaced in the same manner and position as worn before.

Bone cases.—When massaging cases of fracture, bone grafting, or other condition producing callus, depletion movements should be employed to empty the main veins and lymphatic vessels, especially in that portion of the limb which is distal to the graft or fracture. Increased vascularization and consequently improved nutrition, essential to repair, will thus be promoted.

Tendon transplantation cases.—Encourage active rather than perform passive movements of the particular muscles upon which operations have been performed. Apply careful petrissage to the transplanted muscle and friction massage along the new course of the tendons to prevent adhesions. It is essential that these newly transplanted muscles and tendons should not be stretched until they are able to perform their new functions. Similar precautions must be taken in the handling of these cases as with paralyzed or weakened muscles (see muscle cases).

Functional cases.—Massage of these cases should be accompanied by moral and mental suasion. The patient should be encouraged to think hopefully of his recovery, and be interested in his future possibilities. Try to convince him

of the importance of making a real effort to use the functionally weak muscles, and the serious results if he neglects to use them.

Massage before operation—Diagnostic massage.—A course of massage is frequently ordered for cases before operation for bone grafting, tendon transplantations, or nerve suture in which there is old scar tissue near the site of operation. Moderately vigorous kneading should be applied to any fibrous thickening or scar tissue to liberate any latent infection which may possibly be lurking in it, which, if undiscovered before operation, would retard or prevent its success.

Note making.—When making the weekly or fortnightly notes on the clinical progress of a case, vague generalities should be avoided, such as "patient seems better," or "arm improved," and the like. Incorporate in a sentence or two a tangible, clear, and concise statement bearing on the progress of the case in the direction of the main object of treatment.

Examples.—The girth of the thigh muscles has increased 1 inch.

The left quadriceps reacts well, with the exception of the vastus internus, which is lacking in tone and substance, as compared with the right.

The extensors of the toes show faint voluntary contraction this day, June 1, 1917.

Cutaneous sensibility noted over whole dorsum of hand.

Fingers of the right hand are now of the same color and temperature as those of the left hand.

Active flexion at the elbow is obtained to an angle of 90°, passive flexion to 100°, etc.

Nerve cases.—The lesion may be partial or complete.

(A) *Muscles:* Note the complete (paralysis), or partial (paresis) absence of muscular activity, stating the particular muscle or groups of muscles affected.

(B) *Skin.*—1. Cutaneous sensibility. Note the areas of the loss of cutaneous sensibility. This is done with a camel's-hair brush or with cotton wool. The patient's eyes should be closed or bandaged while the tests are made.

2. *Trophic conditions.* Note the condition of the skin, and state any trophic conditions, whether dull, shiny, or scaly, the presence of any trophic ulcers, etc.

3. *Color and temperature.* Describe the color and temperature as compared with the corresponding sound limb, and state whether ischemia or cyanosis is present.

4. *Return of power and sensibility.* After all nerve operations note the date of return of sensation to a previously insensitive portion of the skin, or return of voluntary power in a paralyzed muscle.

5. *Electrical reactions.* The electrical reactions in nerve cases are periodically examined. Inquire of the officer in charge the results of these examinations.

MUSCLE CASES.

1. *Measurements.*—Frequently take the measurement of the circumference of limbs under:

Thigh.—Seven inches above the upper border of patella.

Calf.—Six inches below the upper border of patella.

Upper arm.—Six inches above the tip of olecranon process.

Forearm.—Four inches below the tip of olecranon process.

2. *Muscular tone.*—Describe the condition of the muscles with regard to the degree of resilience, firmness, and tone, i. e., their prompt response to a voluntary stimulus, and compare the amount of contraction with the corresponding sound muscle or group of muscles.

Note the absence or presence of spasm or tremor.

To test the power of grip use the dynamometer frequently and record the readings.

JOINT CASES.

1. *Freedom of movement.*—State whether the movements are free, and, if not, whether accompanied by creaking, grating, or clicking. Also, note if the joint is swollen or not. In the event of a click being detected, state at which particular position of the joint it occurs.

2. *Range of movement.*—Measure the range of movement in the joint which is under treatment at intervals of a fortnight. The anglemeter is used for testing the degree of movement in the shoulder, elbow, wrist, knee, and ankle. State whether the degree of movement obtained is active or passive.

In the case of fingers or toes state whether one-fourth, one-half, three-fourths, or full normal flexion or extension is obtained.

Ischemic hands and feet and trench feet.—Describe the color, temperature, amount of movement, and degree of pain compared with the corresponding hand or foot.

Any sign of retrogression should be noted at once.

Exercises.—When massaging a limb it is essential to perform full movements at the several joints.

In proportion to the amount of movement at the joints and the muscular condition of the limb, the exercise should, in the early stages, be passive in character; as improvement advances active movements should be practiced and later movements with resistance.

In this way a gradual sequence of passive, active, and resisted movements of the joints accompanies the increased range of movement and improved muscular power.

PROGRESS IN MEDICAL SCIENCES.

REVIEWERS.

Commander E. U. Reed, Medical Corps, United States Navy.
Lieutenant Commander C. W. O. Bunker, Medical Corps, United States Navy.
Lieutenant Commander G. F. Clark, Medical Corps, United States Navy.
Lieutenant Commander W. M. Kerr, Medical Corps, United States Navy.
Lieutenant Commander J. J. O'Malley, Medical Corps, United States Navy.
Lieutenant Commander H. E. Harvey, Dental Corps, United States Navy.

GENERAL MEDICINE.

Ravdin, I. S., and Glenn, E. **The transfusion of blood with report of 186 transfusions.** Am. Jour. Med. Sc., May, 1921.

The authors review the history of blood transfusion, discuss its indications, the amount to be transfused, the selection of donors, and describe the method employed in the hospital of the University of Pennsylvania.

They have found the indications divisible into three groups:

I. *Loss of blood.*—To this group belong all those cases of anemia from acute hemorrhage as well as those cases due to small, long-continued blood losses. Some of the latter, however, finally fall into the second group.

II. *Diseased blood.*—Transfusion for this group serves the following functions:

1. To stimulate hematopoietic function.
2. To increase coagulability.
3. To add to the oxygen-carrying capacity.
4. To increase the bactericidal or antitoxic properties of the blood.
5. To increase the general nutrition.

III. *Shock.*—The amount of blood to be transfused depends upon two factors—the indication and the receiving capacity of the recipient. The latter depends upon the condition and size of the patient.

"In cases of severe acute hemorrhage transfusions of large amounts of blood are indicated. We have given as much as 2,100 c. c. in a period of 12 hours. This amount is often difficult to obtain, but 1,000 c. c. can be taken from a donor in good physical condition without any risk. In cases of secondary, primary pernicious, or aplastic anemia we usually use 500 c. c., although if the transfusions are not at very frequent intervals we use 750 c. c. In primary pernicious anemia if the blood count is fairly high and the trans-

fusion is given to stimulate blood formation small transfusions as 250 c. c. are as efficacious as larger ones. In hemophilia 250 to 500 c. c. are sufficient. In melena the size of the transfusion varies from 10 to 100 c. c. Whole blood is most frequently given intramuscularly in this condition."

The fate of the transfused blood has recently been determined by Ashby. He sums up his conclusions by saying: "The life of the transfused corpuscle is long; it has been found to extend for 30 days or more. The beneficial results of transfusion are without doubt not due primarily to a stimulating effect on the bone marrow, but, it is reasonable to assume, to the functioning of the transfused corpuscles.

"In choosing donors for the transfusion three laboratory tests are necessary: The Wassermann reaction, a blood count, and typing. In an emergency the first two may be omitted, but under no circumstances the last. The donor should be a robust young adult, with a negative Wassermann reaction and negative venereal history, and a blood count that is high normal. He must be either in the same type group as the recipient or in Group IV.

"The interaction of the donor's and recipient's cells and serum may be determined by the crossed hemolysis tests, and these tests must be carried out in all cases where the type reading is doubtful. The simple typing with known sera has proved so satisfactory, if accurately done, that only in few cases have we used any other methods for determining the suitability of a donor's blood. The method of Vincent, based on the grouping of Moss, is the one which has been used in most of our cases. A drop of known Type II serum is placed on one end of a clean slide and a drop of known Type III serum on the other end. One drop of the patient's blood is then mixed with each drop of serum. The slide is rocked from side to side gently for five minutes and then examined for agglutination. The type is determined by the following table:

Serum	I	II	III	IV
Group I	−	−	−	−
Group II	+	−	+	−
Group III	+	+	−	−
Group IV	+	+	+	−

"Moss has found in extensive observations that agglutination frequently occurs without hemolysis, but that hemolysis is always associated with or preceded by agglutination. If crossed hemolysis is done we use a modification of Rous' method of testing donor's blood

for transfusion. Take two small test tubes (1 by 5 cm.); in each place four drops of the following citrate solution:

Sodium citrate	gm.	1.5
Sodium chloride	gm.	0.9
Distilled water	c. c.	100.0

"In one tube collect from the finger or ear one drop of the donor's blood and nine drops of the recipient's blood; in the other tube one drop of the recipient's blood and nine drops of the donor's blood. Mix by shaking. Allow to stand for 15 minutes. Take out a drop from each tube and place on a slide. Add a large drop of normal salt solution without mixing. Cover and examine under the microscope for agglutination. If desired, two drops of citrate solution and one drop of blood may be mixed in a third tube, as a control.

"If there is no agglutination in any mixture, the transfusion is safe. If clumping is present in the tube containing nine drops of recipient's blood and one of the donor's, the recipient's blood agglutinates and may hemolyze the donor's blood and transfusion is dangerous. If clumping is present in the tube containing nine drops of donor's blood and one of recipient's it indicates that the donor's plasma agglutinates the recipient's cells. Transfusion under these circumstances is permissible, since the donor's plasma is so diluted as to have little hemolytic power, but it is less desirable than where no agglutination is present.

"The methood used at the university hospital is as follows:

"After a donor has been selected he is placed on an ordinary operating-room table. The selection of the arm to be used depends upon the donor's choice and upon the suitability of the veins for use. The arm is extended and placed on a small table. The site is cleansed with a 95 per cent solution of alcohol and then painted with a 5 per cent solution of picric acid. A tourniquet is applied and sterile sheets are placed so as to surround the operative field.

"A short length, large caliber aspirating needle is used to remove the blood. We find this as efficient as any special needle designed for this purpose, and the cost is considerably less. The needle is inserted into the vein against the current and the blood is collected in a suitable Erlenmeyer flask, which at the start contains one-half of the total amount of sterile sodium citrate solution to be used. We use enough of a 2.5 per cent solution to make the end result 0.25 per cent. While the blood flows into the flask the remainder of the citrate is dropped in with it by means of an ordinary pipette. The flask should be gently shaken during the collection of the blood.

"After the blood is collected the tourniquet is loosened and the needle removed. A small pressure bandage is applied. The flask containing the blood is inverted three or four times and then placed in a basin of water the temperature of which is 120 F.

"The recipient's arm is prepared in a similar manner, a tourniquet is applied, and if the vein is of sufficient size to allow it, a needle is used to introduce the blood. If the vein is not large enough it is necessary to cut down on it and insert a glass cannula. This is, of course, less desirable where repeated transfusions are necessary because it destroys the vein for further use below this point. The skin is first infiltrated with a sterile solution of 0.5 per cent novocain. The incision in the skin seldom needs to be longer than 1.5 cm. The vein is isolated by blunt dissection with a mosquito hemostat, which is then inserted under the vein to carry the catgut ligature. The vein is tied off at its distal end while the ligature at the upper end is merely looped. Sharp-pointed scissors are used to nick the vein in an oblique direction. A mosquito hemostat is applied to either side and to the apex of the triangular nick. While this is being done the assistant holds the proximal ligature taut so as to prevent unnecessary bleeding. The blood is introduced by gravity. A 250 c. c. cylinder containing a small amount of normal sodium chloride at 100 F., is used. The cannula is inserted into the vein in the direction of the flow as soon as all air has been excluded from the apparatus and the flow of saline is established. The tourniquet is now removed. The blood is poured into the cylinder, being filtered through several layers of gauze which have been placed over the top of the cylinder. Even though the blood has been typed and a crossed hemolysis has been done we stop the flow after the introduction of the first 25 c. c. to see if any immediate reaction occurs. If there is any reaction at this time the transfusion is stopped. The blood in the cylinder should be at a temperature of 110 F. and this may be accomplished by keeping the flask in a basin of water at 120 F.

"After the blood has been introduced we again run in a small amount of sterile normal saline. The upper ligature on the vein is tied as the cannula is removed. The skin incision usually needs but one vertical mattress suture. In women accustomed to wearing short sleeves it is preferable to use the internal saphenous vein. This can be used for repeated transfusions, especially if the first incision is just above the internal malleolus.

"When the vein is of sufficient size the same type of needle is used as that used in withdrawing the blood from the donor. It is inserted in the direction of the blood current. After the apparatus is prepared as above it is connected with the needle by a connecting piece."

The symptoms of incompatibility are: (1) Dyspnea, (2) pain in the back, (3) abdominal discomfort and even pain associated with nausea and vomiting, (4) dilatation of the pupils, (5) sweating and flushing of the skin, (6) vertigo and throbbing headache, (7) puffi-

ness of the face and eyelids. Febrile reactions, urticaria, or annoying itching may follow transfusion.

The authors record the following conclusions:

1. With the element of risk practically eliminated blood transfusion has become one of the most effective procedures in modern therapeutics.

2. Transfusion is a specific in acute hemorrhage where the "limit of bleeding" has not been reached, in malena, and in the hemorrhage of hemophilia.

3. It is of definite value in primary pernicious anemia in hastening and prolonging remissions. It is indicated in cases of severe secondary anemia. After transfusion, operations on debilitated or anemic individuals may often be safely undertaken that otherwise would involve serious risk.

4. Transfusion in shock is not as efficacious as in cases of shock associated with hemorrhage.

5. We have not been able to prove the value of transfusion in acute infections, but in chronic infections we have had results justifying its use.

6. Transfusion is of unproved value in acute leukemia. In aplastic anemia it is at the most a temporizing procedure.

7. The difference, as far as reactions are concerned, between the citrate method and the Kimpton-Brown method we have found to be practically nil, and the simplicity of the former warrants its preference. (W. M. K.)

LEMAN I. I. **Diabetes mellitus in the Negro race.** South. Med. Jour., July, 1921.

It was formerly supposed that diabetes was rare in the Negro race, but from a study of the admissions to the charity hospital from 1898–1909, the occurrence of this disease among them was relatively high. The whites showed an incidence of 0.72 per thousand against 0.47 per thousand for the Negroes. The Negroes furnished 40 per cent of the admissions and 30 per cent of the diabetics.

Studying the admissions for the next 10 years, 1910–1919, shows that the remarkable increase in this disease has fallen upon both races with practically equal force.

Again the Negroes have been 43 per cent of the admissions and have furnished 30 per cent of the diabetes as contrasted with 40 per cent of the admissions and 30 per cent of the diabetes in the former period. The total incidence of diabetes has risen from 64 cases in 101,565 admissions in the first period to 194 cases in 160,044 admissions in the second period. This represents an increase from 0.63 per thousand in 1898–1909 to 1.2 per thousand in 1910–1919, or an increase of 90 per cent. The incidence among the whites rose from 0.72 per thousand to 1.4 per thousand, or 94 per cent: that among the Negroes rose from 0.47 per thousand to 0.86 per thousand, or 83 per cent.

Hence, it is fair to say that whatever influences have contributed to the increase of diabetes, noted by Joslin and other observers, have

affected white and Negro alike, and the latter has shown no especial immunity to the operation of their forces.

The wealth of material of syphilis in charity hospital makes it worth while to analyze these figures from this point of view. Warthin considers that syphilis plays an important rôle in the production of diabetes. He has written that:

"Diabetes may be associated with the more marked degrees of syphilitic pancreatitis; and in our autopsy service all of our diabetic cases have been so associated; but that a number of cases of syphilitic pancreatitis of similar degree of severity have not presented the clinical symptoms of diabetes. It seems very probable, therefore, that latent syphilis is the chief factor in the production of the form of pancreatitis most frequently associated with diabetes, but that diabetes is not always associated with severe degrees of this type of pancreatitis."

If this contention be correct, we should find diabetes more common where syphilis is more prevalent. The syphilization of the Negroes is a matter of common notice and its importance is not difficult to prove from the occurrence of conditions which find their basis in syphilis. But diabetes is not more but less common among the Negroes than among the whites. The Negro portion of the admissions is roughly 40 per cent, the Negro portion of diabetes is 30 per cent, but the Negro portion of such diseases as syphilitic iritis, gumma of the brain, gumma of the liver, aneurism of the aorta, is 60 and 70 per cent. The Negro portion of all cases of acquired syphilis is 56 per cent and of congenital syphilis is 52 per cent.

If syphilitic pancreatitis is the chief or even a frequent factor in the production of diabetes, it is strange that we do not see an abundance of diabetes in the Negro services of the charity hospital which are so rich in other luetic phenomena.

It is fair, I think, to conclude that syphilis is playing no important part in producing diabetes. This, however, is very different from saying that syphilitic pancreatitis does not at times produce diabetes.

Attention has been drawn time and time again to the effect of nervous influences in the production of diabetes. Nervous strain, intense application to business, mental shock, and worry have frequently seemed to play an important rôle, at least, in precipitating the phenomena of the disease or aggravating it. The Negro race is to a very great degree free from these influences. The average individual is happy-go-lucky, living from hand to mouth and from day to day, without great responsibilities and without great ambitions which carry with them great cares. I do not mean that the race is without the finer sensibilities, but that its nervous burden is light and its nervous toll is small aside from the ravages of lues. The mental and

nervous make-up of the Negro is in marked contrast to that of the Jews, among whom diabetes is disproportionately frequent. (J. J. O'M.)

JOHNSON, J. P. **The Diagnosis of Syphilis in malarial subjects by the Wassermann reaction.** Jour. Path. and Bacteriol., April, 1921.

This investigation was conducted by the use of (1) the original Wassermann method, (2) Tschernogobouw's modification, (3) Fleming's modification, (4) Hecht-Fleming method on each serum, in separate laboratories with independent workers. The sera were obtained from 19 cases where the blood was taken during or shortly after rigor; from 45 cases with no record of rigor but where the first specimen collected had parasites present in the blood, 10 cases in whom parasites were not found in the first specimen but were subsequently found during relapses. All cases received 20 to 30 grains of quinine per day. Seven hundred and thirty-eight tests were made, averaging 10 tests per case.

AUTHOR'S CONCLUSIONS.

The conflicting opinions published in regard to the Wassermann reactions in malaria may therefore arise from the variable conditions under which the Wassermann test is carried out, and emphasizes the need for standardization and the adoption of retesting in all cases in which one positive result is obtained unless such case is clinically syphilis. It does not appear unreasonable to assume that the small number of cases in this series in which the Wassermann reaction was positive on retesting (7 per cent) were cases of latent syphilis. This investigation indicates that the blood in active benign tertian, malignant subtertian, and mixed (B. T.+M. T.) malaria does not give a positive Wassermann reaction. Positive reactions are due to syphilitic infection, or to certain causes connected with the technique employed or to nonspecific changes in the patient's serum as yet not completely understood. In such cases the serum should be invariably retested after an interval. A positive reaction confirmed by a subsequent test is evidence of syphilitic infection. (G. F. C.)

OSBORNE O. T. **So-called diseases of the blood.** New York Med. Jour., May 18, 1921.

We can not properly recognize or treat disturbances of the blood without a good understanding of its physiology as well as its pathology; therefore, before discussing the diseases of the blood, the author of this paper recalls a few important physiological facts.

Red bone marrow produces the red blood cells. In normal conditions and in health the red cells have no nuclei, although nucleated reds appear in the blood in certain diseases and in emergencies.

When there is a great demand for red cells and the bone marrow is stimulated to an extra production, so-called reticulated cells appear in the blood. This stimulation seems to occur when large numbers of red cells have been destroyed, or after hemorrhage, but this rapid new production of red cells by the bone marrow seems to be inhibited if too large transfusions of blood are given.

The polynuclear leucocytes are produced in the bone marrow. The mononuclear cells, termed lymphocytes, are of two varieties, the large representing about 3 per cent of the total leucocytes, and the small representing about 25 per cent of the total leucocytes. These cells are produced by the lymphatic tissues and glands.

The hydrogen-ion concentration of the blood should approximate $pH=7.4$, and the blood should be slightly alkaline to litmus. Any marked variation from this amount of the hydrogen-ion concentration causes symptoms, and if an acidosis occurs there is profound intoxication and coma. Any disease that diminishes the number of red-blood corpuscles diminishes the alkalinity of the blood. The condition of acidosis most frequently occurs in serious diabetes, but any secondary anemia or deprivation of food will decrease the alkalinity. Also the hydrogen-ion concentration may be decreased when the body is fighting serious infection, and especially if the patient is not receiving a sufficient amount of carbohydrates.

The specific gravity of the blood may have a normal range from 1.04 to 1.07. If the specific gravity is much below this limit, destruction of red blood cells can occur, and edemas and all the symptoms of poor circulation develop. If the specific gravity is much above this limit, disturbances from the increased viscosity occur, with a tendency to phlebitis.

About 14 per cent of human blood consists of hemoglobin, and 96 per cent of the hemoglobin is globin and 4 per cent is hematin, and it is the hematin that contains the iron, about 0.4 of 1 per cent.

Late investigations seem to show that not more than one-twentieth of the body weight is blood. The weight of tissue that is constantly in motion in the adult emphasizes the importance of keeping him in a horizontal position if he is in a weakened condition. Roughly estimated about one-fourth of the blood is in the heart and large vessels, one-fourth in the liver, one-fourth in the muscles, and the remaining fourth is distributed among the various internal organs. We may vary the amount of blood in different parts of the body by position, by moist and dry heat, and by cold applications, a fact of advantage in treating abnormal conditions. The amount of blood that can be lost by hemorrhage without being fatal is very great, provided that the loss is stopped and suitable fluids are rapidly given intravenously. It is not absolutely necessary that the fluid administered should be blood. Physiologic saline, or, better, Ring-

er's solution or Locke's solution, containing 5 or 10 per cent of gum acacia, may be as efficient as an injection of pure or citrated blood.

The blood platelets emanate from the red bone marrow and their number varies in different conditions. Normally they are thought to be about 250,000 to the cubic millimeter. They are diminished in pernicious anemia, in most cases of lymphatic leucemia, and in some cases of myeloid leucemia.

They are greatly reduced in purpura hemorrhagica, which seems to be due to an inability of the bone marrow to produce blood platelets or, possibly, to some condition of the blood which destroys them.

The function of the spleen seems to be to produce leucocytes and lymphocytes and to destroy or at least be a storehouse for broken-down red corpuscles. Associated with the liver and bone marrow, it has something to do with the production of hemoglobin. All of these functions may be assumed by other organs when the spleen has been removed. The spleen also seems to produce or to encourage the activity of phagocytic leucocytes, as during infection it becomes hypertrophied.

Banti's disease may not be a clinical entity, but a manifestation of visceral syphilis. Several observers believe that in this disease the enlargement of the spleen, with later disturbance of the liver and ascites, is due to syphilis.

Acute aplastic anemia differs from pernicious anemia in that there is no blood destruction, but the bone marrow is so diseased that it can not produce blood cells. It may follow a mild infection and emphasizes the importance of seeking and eradicating all foci of infection as soon as any form of anemia occurs.

Acute anemia caused by hemorrhage in sufficient amount to require transfusion is best treated by the intravenous injection of 5 to 10 per cent acacia in Locke's or Ringer's solution.

Secondary anemias can only be improved by treating the cause, which may be anything from a cancer or tuberculosis cachexia to a chronic focal infection, a chronic purulent discharge, an albuminuria, persistent small hemorrhages, or to underfeeding.

Chlorosis is probably caused by a failure to function on the part of one of the endocrine glands. It is almost always associated with amenorrhea, frequently with subthyroid secretion, and often with insufficient ovarian secretion.

Pernicious anemia is caused by a disturbance in the blood marrow and is probably due to an infection. A large number of cases are associated with infection in the mouth; others have been associated with intestinal parasites. There is a diminution of the hydrochloric acid secretion in the stomach and always more or less putrefaction in the intestines, and the liver is impaired. The treatment is summed up as follows: If a Wassermann test is positive, administer arsphe-

namine. Remove all intestinal parasites and focal infections. Prevent putrefaction in the colon. Administer hydrochloric acid, small amounts of iron, and not infrequently a small daily dose of thyroid and a fair daily dose of suprarenal. The suprarenals are generally insufficient in any infection and in all chronic disability. The rest of the treatment consists of sunlight, fresh air, good food, and perhaps heliotherapy.

All that has been said in regard to infections being the cause of pernicious anemia is equally applicable to the lucemias.

Hodgkin's disease is due to an infection, and the lymph glands first to enlarge are those nearest the point where the infection has entered. (W. M. K.)

De Brun, H. S. **Singultus.** New York Med. Jour., June 1, 1921.

A symptom which has come prominently to the attention of the physician in the past two years is singultus or hiccough. Singultus is a reflex irritation of a complex nature with afferent impulses to the respiratory center and efferent impulses carried through the phrenics to the diaphragm. Hence there is a clonic spasm of that muscle causing a sudden inspiratory movement with rapid closure of the glottis through the stimulation of the laryngeal filaments of the vagi.

Seven distinct types are demonstrable.

1. *Simple.*—A type caused by sudden exposure to cold and the drinking of a cold potion or cold carbonated beverages. In this type the symptom lasts not more than three to five minutes.

2. *Inflammatory.*—A type which appears after the onset of such inflammatory diseases of the abdominal organs as gastritis, appendicits, enterocolitis, pancreatitis, strangulated hernias and in any condition causing a high temperature which produces a general congestion of the viscera. During the influenza epidemic the persistent and obstinate hiccoughs noted were found in the majority of cases to follow a marked congestion of the upper respiratory tract as well as an inflammation of the bronchi, and as soon as this inflammation had subsided the singultus disappeared. In acute inflammatory diseases of the abdomen, hiccough is a bad omen.

3. *Irritative.*—This class is usually of a transitory nature when it is brought on by a single acute indigestion or dilatation of the stomach. It is frequently seen after the ingestion of foods of high or low temperature or very spicy foods. The condition is most common in the gastrointestinal irritations. It is an alarming symptom in postoperative conditions and especially when there has been manipulations of the upper abdominal region causing a reflex irritation of the phrenics and pneumogastrics through an existing inflammation of the viscera supplied by these nerves.

4. *Traumatic.*—Hiccough was a frequent symptom seen in the practice of war surgery, especially of gunshot wounds of the neck, chest, and upper abdomen where the pneumogastrics or phrenics were injured or the tissues supplied by them inflamed.

5. *Specific.*—In uremia when urates and urea begin to diminish rapidly in the urine and uric acid and cholesterin rapidly begin to increase in the blood, there is often the onset of an obstinate hiccough which fluctuates with the increase or decrease of the chemical blood constituents.

6. *Neurotic.*—A hysterical singultus in a neurotic person is not uncommon.

7. *Unknown origin.*—The hiccough in bronchial asthma and that coming on with a terminal arteriosclerosis can not be explained by any known factor.

The hic or spasmodic closure of the glottis usually comes on every 10 to 16 seconds. If the spasms become more numerous the prognosis is grave, due to the rapid onset of exhaustion. When the attack has lasted several hours, in addition to the signs and symptoms of the causative factor, soreness and pain over the epigastrium and lower chest becomes manifest. This is followed by a sense of pain in the throat with dryness and extreme thirst. Headache comes on and may be severe. There is a rapid, weak pulse, and vomiting. The patient becomes nervous and worried and has fear of impending death, and gradually he becomes exhausted and either falls asleep and wakes repeatedly or he passes into a coma with high temperature, and dies.

The simple type requires no treatment in the majority of cases, but should the condition become annoying, the author recommends the following physiomechanical methods: (1) Tongue traction for two minutes, (2) holding the breath and counting, (3) the blowing of a wind instrument, (4) galvanism applied to the neck, (5) lowering of the head and stretching of the sphincter ani, (6) sipping of water, hot or cold, (7) pressure in the neck over the fifth cervical vertebra, (8) tickle the throat (vomit) and tickle the nose (sneeze), (9) gargle with a bitter solution, (10) have the patient inhale amyl nitrite, (11) mustard plaster applied to the epigastrium, (12) ice bag or ethyl chloride spray to the epigastrium, (13) the flexion of the legs on the thighs and the thighs on the abdomen, (14) pass a stomach tube or an esophageal bougie.

Should these simple methods fail a few whiffs of chloroform will usually stop any persistent hiccough.

In hiccough caused by the inflammatory process the disease should be treated above all, and then the hiccough should be attacked by the elimination of toxins through gastric lavage with bicarbonate of soda, soap suds enemas, purges, emetics. In the severe inflammatory diseases opiates should be administered early.

Many cases during the influenza epidemic were relieved by spraying the nose and throat with a solution of cocaine and adrenalin, together with hot applications to the epigastrium and small doses of atropine. In the treatment of irritative singultus, one should always remove the cause if possible. This is generally an acute dilatation of the stomach or an acute gastritis, which are relieved by purges, emetics, and enemas. The pain is allayed by means of hot-water bottles to

the epigastrium. When vomiting, if present, has ceased, a little cocaine may relieve the nausea. If the singultus persists after the treatment for the primary condition has been carried out, the physio-mechanical methods mentioned above may be tried, and if they are not successful atropine alone or with morphine should be used. If used alone it must be pushed until the physiological effect is seen.

In postoperative conditions where there is an obstinate singultus it is good practice to keep the patient under opiates. (W. M. K.)

LOWSLEY, O. S. **The rôle of the prostate and seminal vesicles in arthritis.** New York Med. Jour., May 4, 1921.

In recent years interest in the subject of arthritis has been revived by the excellent work done on focal infections of the teeth, tonsils, and sinuses, and in this article Lowsley calls attention to the prostate gland and seminal vesicles as sites of focal infection. The report is based on a study of more than 100 cases of gonococcus infections of the joints.

His conclusions are:

1. No case of arthritis in the male adult is properly investigated unless a rectal examination is made.

2. Prostatic fluid should be examined in the fresh state under the high-power lens of the microscope to determine the presence of pus or pathological elements. The process of staining masks the true conditions in some instances.

3. In a chronic prostatitis the gonococcus is rarely met with.

4. Treatment suggested in very acute arthritis (gonorrheal):

(A) Rest in bed.

(B) Massive doses of gonococcus vaccine seem to allay the pain in many instances.

(C) In some cases vaccine relieves the pain temporarily. In fact, almost any procedure, including the administration of an anesthetic without operation, will relieve the discomfort temporarily.

(D) Dr. Collings's work on very heavy plaster casts proves his method to be as beneficial as any other treatment tried, if not more so.

(E) Dr. Keyes's suggestion that the proper time to operate upon seminal vesicles is in the earliest stage of acute gonorrheal arthritis may turn out to be a very valuable plan to pursue.

(F) It would seem logical that the only kind of seminal vesicles that should invariably be operated upon are the ones distended with pus, that can not be emptied by stripping, and that seminal vesiculectomy is the preferable operative procedure. This applies to cases of acute and chronic arthritis.

(G) After the very acute joint symptoms have subsided the prostate and seminal vesicles should be treated until they are cured. If

they are left in a state of chronic inflammation, the patient is harboring a slumbering volcano which may burst into activity upon the slightest provocation.

(H) Autogenous vaccines, obtained from prostatic and seminal vesicle fluid, have proved to be extremely valuable adjuncts in some instances. They should be used in conjunction with routine prostatic treatment, however, otherwise the prostate will remain a scarred, leathery mass, bound down by adhesions, and a constant source of irritation.

5. One should not approach the subject of arthritis with a fixed plan of procedure. The type of treatment should be determined by the character of the case. (W. M. K.)

NEUBERGER, J. F. **Medical aspects of Naval aviation.** Mil. Surgeon, July, 1921.

In speaking of the physical examination of candidates for aviation duty, the author points out the difference between the physical requirements of a lighter-than-air pilot and a heavier-than-air pilot. Heavier-than-air machines include airplanes and seaplanes of all sorts, and lighter-than-air machines comprise dirigibles and free and kite balloons. A man with an average physique might make an excellent lighter-than-air pilot, but he can not handle an *H-16* or any other heavy seaplane where physical strength and endurance are required over a long period of time. The minimum weight of any heavier-than-air pilot in the Navy should be 150 pounds. It takes considerable strength and endurance to handle a big boat in bumpy air. The best physical specimens are often in danger on account of bumpy air. Men weighing less than 150 pounds should not be trained in heavier-than-air crafts, unless they are constantly retained for small seaplanes or scout duty, which is not the policy of the Navy at the present time.

In order to obtain a certain standard in regard to height, weight, and muscular development, the author recommends the following methods. The first method is known as the "factor of Bouchard." The factor is represented by P/H. P is the weight in kilograms and H is the height in decimeters. The average of this factor gives a first indication of wasting or obesity. This factor, however, only gives a preliminary indication. It may range from one to seven. No one under 3.9 or above 5 should be accepted. If, for instance, a man weighs 140 pounds and measures 69 inches, then the factor would be as follows:

140 pounds=63 kilograms.
68 inches=17.2 decimeters.

$$\text{Therefore } \frac{63}{17.2} = 3.7.$$

The man is therefore under passing mark.

Another index of measurement, which the author considers better than the "factor of Bouchard," may be taken from the formula $(P+p)-T$, P representing the weight in kilograms, p the circumference of the chest in centimeters, T the height expressed in centimeters. The average constant for a qualified subject is -20. The farther the figure falls below this mark the better will be the general constitution of the man under examination. Neuberger checked all the pilots at the United States Naval Air Station, Rockaway Beach, by this method and found that those pilots who came farthest below the average mark were not only the best physical specimens but also were the best aviators on the station. Neuberger picked out for illustration three fliers, who were all heavy seaplane pilots. The first man has the reputation of being an excellent pilot, the second is a fairly good pilot, and the third one has been reported by the squadron commander as having a great deal of difficulty in handling a large plane.

Officer No. 1 (excellent pilot):

Weight	187	pounds= 83	kilograms.
Height	70½	inches =187	centimeters.
Chest (means)	38	inches = 98	centimeters.

$(83+98)-187=-6.$

Officer No. 2:

Weight	147	pounds= 66.5	kilograms.
Height	66	inches =167	centimeters.
Chest (means)	34	inches = 86	centimeters.

$(66.5+86)-167=-14.5.$

Officer No. 3:

Weight	121	pounds= 55	kilograms.
Height	68	inches =172	centimeters.
Chest (means)	30½	inches = 77	centimeters.

$(55+77)-172=-40.$

(W. M. K.)

MICHEL, L. L. AND GOODMAN, H. Treating syphilitics. New York Med. Jour. July 20, 1921.

The authors came to the following conclusions:

1. The patient with syphilis, and not syphilis, should be considered by the physician when it comes to treatment. The tissues of the patient are worthy of respect, especially when one considers that the assault of the drugs needed in treatment is added to the tissue damage of the spirochetes.

2. Specific treatment of the syphilitic requires arsphenamine, or one of its newer salts, neoarsphenamine, sodium arsphenamine, or silver arsphenamine. Mercury is also used in the specific treatment. The iodides are very valuable, especially in the later stages of the disease.

3. The use of arsphenamine in the prophylaxis of syphilis is a phase in treatment that is very important, and its results make it worthy of wider use. Its share in the public-health aspects of this disease are especially valuable.

4. The intensive treatment in the early syphilitic, both when the abortive action and the quick and thorough sterilization of the patient seems feasible, is recommended for otherwise healthy persons with syphilis. Care in selection of the patient for this form of therapy is of first importance.

5. Modified forms of injection of arsphenamine should be given according to the patient, the reactions of his excretory organs, response to drugs, and phase of the disease process.

6. Iodides form a valuable addition, and the intravenous route should be considered, especially if large doses by mouth tend to upset the patient.

7. Systematic and systemic examination of the patient should be made at intervals, with especial reference to the cerebrospinal system. When indicated, the lumbar puncture for diagnosis and treatment is advised.

8. Routine treatments in syphilis should be disregarded. Every syphilitic patient should be treated as an individual requiring attention, and not as a case of syphilis. (W. M. K.)

VEDDER, E. B. **The etiology of scurvy.** Mil. Surgeon, August, 1921.

The author in discussing his investigations into the etiology of scurvy gives the following well-defined method of procedure for investigating the nature of the dietary deficiency producing a certain disease of this nature:

1. Find a suitable experimental animal; i. e., one peculiarly susceptible to the specific deficiency and which, therefore, suffers from the disease after a short depletion period.

2. Use a diet complete with respect to other food elements, but which produces the particular disease with regularity in the chosen animal. Such a diet should contain not only protein, fat, carbohydrates, and salts, but a sufficiency of accessory food substances other than the one under investigation.

3. Find a food that prevents the disease when added to the above diet.

4. Find the minimum amount of this food necessary to confer protection.

5. Prepare extracts of this food that also confer protection. The nonessential elements of the protective food are then eliminated one by one, and when a sufficiently simple extract has been secured, the nature of the accessory food substance may be determined by chemical methods.

Holst and Froelich, in 1907, not only showed that the guinea pig was susceptible to scurvy but that the disease was the same pathologic process observed in man, and like the disease in man, could be cured or prevented by the administration of fresh leaves, such as

cabbage and by certain fruit juices. More recent investigations have taught us much concerning the prevention and treatment of scurvy, including determinations of the relative amount of antiscorbutic substance in certain foods, and the effect on this substance of drying and cooking such foods; but we have learned little concerning the chemical nature of the antiscorbutic substance since that time.

Vedder began some investigations in 1917, the purpose of which was to learn as much as possible about the chemical constitution of the antiscorbutic substance. His conclusions are as follows:

1. Scurvy can be produced in guinea pigs with regularity by feeding a liberal and varied diet consisting of oats, mixed scratch feed, bread, sterilized milk, and hay.

2. Scurvy may be prevented by the daily addition of 5 grams of green grass or 5 c. c. of filtered orange, lemon, or grapefruit juice, and cured by larger amounts.

3. The antiscorbutic vitaliment is soluble in water, absolute alcohol, acetone, and commercial ethyl acetate.

4. The antiscorbutic vitaliment can not be extracted from the partially dried juice by ether, chloroform, or carbon tetrachloride.

5. The antiscorbutic vitaliment differs from the beriberi-preventing vitaliment in the following particulars:

A. The antineuritic vitaliment is absorbed by finely powdered animal charcoal. The antiscorbutic vitaliment is not so absorbed.

B. The antineuritic vitaliment is precipitated by phosphotungstic acid. The antiscorbutic vitaliment is not so precipitated, but is probably destroyed.

C. The antineuritic vitaliment is a nitrogenous base. The antiscorbutic vitaliment is apparently nonnitrogenous.

6. By means of the solvents mentioned above a purified extract has been prepared which is suitable for further chemical study.

(W. M. K.)

Howe, P. R. **Food accessory factors in relation to the teeth.** Jour. Dent. Research, March, 1921.

The condensed review of Dr. Percy R. Howe's work in connection with food accessory factors in relation to the teeth appears in the March number of the Journal of Dental Research, and the subject matter, together with some 50 illustrations, gives food for reflection, as his conclusions may lead to a modification of the generally accepted theory of Miller's bacteriochemical causation of dental caries.

Howe regards Miller's theory as an inadequate explanation of the etiology of caries, but believes, however, that the supply of vitamines in the diet may have much to do with the incidence of caries and with the extensive decalcification, "in the teeth, in the alveolar process, and in the jaws themselves."

The experiments described were conducted on guinea pigs and rabbits, with diets that were "deficient in each of the three known kinds of vitamines" and strikingly scorbutic in general effect.

Howe believes that the fat-free milk in the diets "presumably furnished a sufficient amount of inorganic constituents."

Scorbutic effects could be, and were, prevented or repaired by addition to the diet, when desired, of suitable amounts of antiscorbutic foods, such as orange juice.

Howe summarizes the significance of his findings in the conclusion that it is his ability "to produce decalcified areas in the bones of the head and in the teeth, with deficient diet, and to effect their recalcification with adequate diet, that is the most striking thing in these experiments."

A determination of causative factors often leads to the discovery of scientific preventive measures, and it is to be hoped that further developments along the lines indicated above may ultimately prove of practical value in the dental field which offers the widest of opportunities, that of preventive dentistry. (H. E. H.)

SURGERY.

STEPHENS, H. E. R. **Immediate surgery in fighting ships.**[1] Jour. Roy. Nav. Med. Service, London, April, 1921.

Surgeon Lieutenant Commander Stephens reviews the surgical treatment of the injured immediately after a sea engagement. The explosion of a shell either on the upper deck or between decks creates utter disorder. The most severely wounded should receive attention first but in practice there is little time to pick and choose. Morphia should be administered in full doses by the hyperdermic method, and a label indicating the dosage and the time fixed to the clothing. There is no other article in the surgeon's equipment so indispensable as this drug. Half a grain as the initial dose gives satisfactory results. Men who have sustained severe injuries a few minutes previously bear full doses admirably, and therefore the drug should be administered boldly.

Whether the time and labor expended in teaching the principles of first aid to the ship's company is justified by the results obtained in practice is a matter open to discussion. The moral effect is no doubt excellent, but, on the other hand, the average British sailor does not take kindly to bandaging wounds. When a catastrophe occurs the majority are terrified at the sight of their mutilated shipmates; instinctively they shrink from touching blood and invariably seek aid from the trained staff. Stephens's war experience has proved to him that every officer should be well grounded in the principles of first aid.

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[1] See Keen's Surgery, Vol. VII, p. 249.

Owing to the high temperature of shell fragments, the occurrence of primary hemorrhage was less than was expected. In the large shell wounds the tissues are seared and torn and consequently ooze rather than bleed profusely. When primary hemorrhage does occur it is apt to be profuse.

When the ship is outside the range of further action and "secure" has been sounded, the activities of the surgeon will enter upon a second stage in the practice of emergency surgery. The amount of immediate surgery to be undertaken will depend on the time which will elapse before the wounded can be transferred to a hospital ship, a base, or a neutral port, and the state of the ship herself and the probability of a second engagement.

Emergency surgery does not call for an abundance of instruments and the British medical officers found that those supplied to fighting ships amply fulfil all reasonable requirements.

Stephens says that the metal tourniquet devised by Sir George Lenthal Cheatle marks a distinct improvement over the india-rubber one of Foulis for use in a ship. Its chief advantages lie in the ease of application and the accuracy with which it can be adjusted to control hemorrhage absolutely or flush the tissues when desired. The instrument consists of a chain and securing hook controlled by an operating screw with a handwheel. The bridge is applied over the point of compression. A towel should separate the apparatus from the skin; and the whole can be sterilized by boiling.

When under the anesthetic each patient should be examined systematically in order that injuries to the eyes, ribs, back, or buttock may not be overlooked. Unsuspected lesions discovered are noted at the time, so that on transfer to the hospital ship a concise and complete description of the injuries may accompany each man.

Contusions are more commonly produced by men being thrown against a bulkhead or one of the internal fittings of the ship by the force of an explosion. Others are caused by the falling of part of the superstructure. They present an infinite variety and occur in unexpected positions.

If we except burns, contused lacerated wounds are responsible for most of the casualties. They differ from those encountered in military surgery by the absence of contamination with earth—a fundamental difference.

The importance of cleansing the skin in the vicinity of any wound can not be emphasized too often. Ether soap is useful for the purpose and a spirit lotion of mercury biniodide or iodine is then applied. The superficial wounds should be opened up freely so that the interior may be cleansed and a thorough search made for foreign bodies, especially tags of clothing. If the surgical toilet has been efficiently

carried out, complete excision of the wound with primary suture is the method of choice.

In deep lacerated wounds the damage below the surface invariably exceeds that which is visible to the eye. A free incision for disinfection of the cavity is indicated, but as little repair as possible is attempted, and anything in the nature of a dissection rigidly avoided. Extensive exploration of the deep-lying structures can not be justified unless hemostasis is the object. Tissues that are manifestly devitalized should be excised. Rough handling of the parts can not be condemned too strongly; it increases secondary wound shock. Strips of fasciæ and torn tendons which hang loose are best removed, since they usually slough owing to their poor vascularity. Fragments of bone lying free may be taken out without any misgiving.

Primary suture of deep, ragged, and lacerated wounds is contraindicated absolutely; but the aim of the surgeon is to render them eligible for delayed primary suture of a later period. Complete hemostasis is first secured. Large arteries are ligated at the site of injury or at a distance according to circumstances. Nerves suture is out of the question, but section and injury of nerves should be carefully noted for the information of those who receive the case in a hospital ship or shore establishment. These large wounds may be safely left open after cleansing if free drainage has been established. Perforated rubber drainage tubes should be inserted to the bottom of the cavity and packed lightly around with sterile gauze. These tubes enable the deepest parts of the wound to be flushed with a suitable antiseptic solution during transportation. However, extensive and lacerated a wound may be, acute suppuration or gross infection can be overcome by intelligent application of these principles and the majority of wounds will reach the base ready for delayed primary suture.

A large number of the diverse varieties of splints are out of place in a fighting ship. The large number of compound fractures sustained in action, however, seems to call for a universal splinting material. The aluminum alloy introduced by Sir Frederick Treves supplies the want. This substance is almost ideal for emergency work afloat. It is easy to mold into the required shape; it is light, serviceable, takes up little space, and in use is efficient.

Fractures of the humerus are best put up in the type of splint devised by Hey Groves or Sir Robert Jones. Fractures of the femur are difficult to handle on a fighting ship. Most of them are compound and require a general anesthetic for cleansing the wound. When the cleansing process is completed the limb should be extended and immobilized in a Thomas's knee splint.

Owing to the peculiar nature and the high mortality associated with severe burns, they have assumed a position of great importance

in naval surgery; and their treatment demands the utmost care and attention from the surgeon. The cardinal point in treatment is the prevention of infection. With this in view all burns should receive a most thorough cleansing, preferably under a general anesthetic as soon as possible after infliction.

As a primary dressing, picric acid is recommended; as a permanent dressing, the prevailing opinion is opposed to its use. Stephens recommends an oily dressing consisting of menthol 3 grains and oil of eucalyptus 3 minims to an ounce of carron oil. A 1 per cent aqueous solution of aluminum acetate is useful for superficial burns, but is apt to be irritative. The paraffin preparations, like ambrine, are still in an experimental stage, yet they bid fair to supersede all other preparations.

Secondary wound shock is caused by the toxins absorbed from damaged tissues, hemorrhage, cold, and fatigue. It is prevented to some extent by reducing the transportation of the wounded to the minimum, shielding them from exposure, and controlling hemorrhage. When the symptoms appear, immediate remedial measures become imperative. Intravenous administration of a 6 per cent solution of gum acacia in normal saline gave the best results on board ship. This procedue not only increases the blood volume but also the viscosity of the blood itself. It relieves the oligæmic state and prevents it from reasserting itself.

It is manifestly impossible to lay down hard and fast rules for amputation. Extreme cases present no difficulty. Removal of a badly shattered limb adds to the comfort of the patient and improves his chance of recovery. In cases where the injury is not severe, a thorough examination of the lacerated parts will decide the question of amputating or not. The main principles of conservative surgery should remain uppermost in the surgeon's mind, and his efforts should be devoted to saving the limb rather than removing it. Extensive laceration of muscle associated with marked comminution of bone do not justify amputation. Many cases, which at first appeared hopeless, recover in a remarkable manner provided that acute suppuration can be avoided. On the other hand, where the main blood vessels and nerves have been destroyed, or the distal parts pulped, the prospects of a sound recovery are enhanced by a simple and rapid amputation. (W. M. K.)

Dalton, F. J. A. **Immediate surgery of war wounds as practiced in hospital ships.** Jour. Roy. Naval Med. Service. London, July, 1921.

Surgeon Captain Dalton, R. N., tells of his observations on the hospital ship *Rewa*, of which he was in charge. He found that the character and amount of immediate surgery on wounded admitted to the hospital ship varied a good deal with the circumstances under

which the wounded were received and the time they were to remain on board. In the *Rewa* the length of time patients remained on board varied from 36 to 48 hours while conveying French wounded from Dunkirk to Cherbourg during the first Battle of Ypres, in 1914, to between three and four weeks when conveying wounded from the Gallipoli beaches to England.

The French wounded arrived on board completely exhausted, hungry, and caked from head to foot with thick clay. Many of them had been lying in the wet fields for 48 hours after they had been wounded and before being found by the ambulance parties. The majority had their first field dressings on their wounds.

A large proportion of the fractures were not even splinted. Among these men one often saw the evil effects of a misapplied or too long applied tourniquet, necessitating amputation of arm or leg for gangrene.

At the Gallipoli beaches the ship was working under very different conditions to those appertaining to France. The weather was very hot and the atmosphere dry as opposed to cold and almost constant rain in France. The wounded were received soon after being injured, and the " first aid " had been efficiently done, fractures being splinted and dressings carefully applied, and injections of morphia given.

There were two serious disadvantages in working with the wounded at Gallipoli. One was the plague of flies and the other was the fact that so many of these patients were already suffering from severe diarrhea when wounded.

Patients were hoisted on board, simply black with myriads of flies, and soon the whole ship was infested with them. On removing the dressings, wounds were often found to be infested with maggots.

The diarrhea was of a severe type, and large numbers of wounded were badly soiled by feces. The additional work entailed in cleaning these patients was considerable, as compound comminuted fractures of the thigh were very common.

The following routine was adopted on the *Rewa* when receiving patients: Every patient was seen by a medical officer as he was hoisted into the ship or walked on board. If considered a suitable case for examination in an operating room, he was placed in a cot resting on the deck outside one of the operating theaters to await his turn; if not, he was put to bed in a ward; or if a walking case, sent to a dressing station, to be seen by the medical staff of the dressing station. It was a standing rule that if the examining medical officer had any doubt in his mind as to which category a case belonged, he was always to decide it was an operating-room case. Thus all compound fractures, head injuries, injuries about the neck, cases requiring amputation, all wounds where fresh hemorrhage was taking place,

large bomb and shell wounds, and abdominal wounds automatically passed through one of the operating theaters before being put to bed. This method of dealing with the wounded entailed enormously heavy work for the whole staff; the longest stretches of continuous work in the theaters extended to 44 and 46 hours on two occasions, but stretches of 12, 15, and 16 hours were not infrequent. During these long hours of work sandwiches and coffee were supplied at regular intervals to the staff and partaken of in the anesthetic rooms while the theaters were being washed down with a hose. The operating rooms used to get into an indescribable condition of filth and needed washing down frequently. There was no doubt that this immediate dealing with all the more serious cases was the means of saving many lives and more limbs.

The average patient received exhibited very little shock. This fact must be credited to the large dose of morphia administered between the time of being wounded and the arrival on board. Patients who did arrive with severe shock were generally those with wounds of the abdomen or chest, lacerated bomb and shell wounds with destruction of tissue over large areas, cases that had lost much blood from wounds of main vessels, and cases of compound fractures of large bones.

All cases of severe shock were placed in bed for 6, 12, to 24 hours, and the usual remedies for shock, such as warmth, hot drinks, stimulants, and intravenous saline applied.

No attempt at skin sterilization was made until the patient was brought into the operating room under an anesthetic, when, his clothes having been removed, a wide area around the wound was shaved and well scrubbed with soap and water with the aid of a nail brush. This area was then dried off with methylated spirit and 1 in 40 carbolic lotion applied.

Chloroform, chloroform and ether in the proportion of one to two, and open ether were the anesthetics used in the order of their popularity.

An essential for success in operative work of this kind on a hospital ship is the working out of the administrative details of each operating table to the minutest degree. Each table must have its own equipment and operating team.

After the skin area had been cleaned, the wound was investigated, foreign bodies and loose fragments of bone removed, muscle and fascia which had been injured and was likely to slough was cut away. Free counteropenings were made for efficient drainage, and large drainage tubes with copious irrigation with sterile salt solution or Dakin's hypochlorite solution were used.

Among over 20,000 cases treated on the *Rewa* not a single case of secondary hemorrhage occurred.

Captain Dalton remarks that the aluminium splint was, on the whole, rather disappointing as it was not really strong enough for large heavy limbs. Among the named splints he found most useful were Thomas's hip and knee splints, Hodgen's splint, Middledorp's triangle. The best splint, in his opinion, for the transport of fractured thighs was Thomas's splint.

The operating staff of the *Rewa* found that there are two regions of the body which do not invite immediate surgery for gunshot wounds, viz, thorax and abdomen. In injuries of both there is usually profound shock when the patient is received on board, and this alone eliminates the question of immediate operation.

Wounds of the thorax, when the missile has passed through the chest without injury to large vessels or spinal column, do remarkably well without surgical interference, the patient being kept under morphia and the shock counteracted. Usually the patient has slight hæmoptysis and considerable dyspnea, but both pass off rapidly. A few develop empyema or consolidation of a lung. In gunshot wounds of the abdomen, each case must be dealt with according to its own particular symptoms. The majority of these cases are too shocked to stand immediate operation, and are placed in the Fowler position, kept deeply under morphia, given nothing by the mouth, and only saline by the rectum or intravenously. A fair proportion recover under this expectant treatment, some requiring suprapubic drainage for their peritonitis.

"*The most rapidly fatal cases*, apart from those dying very quickly from internal hemorrhage, are those in which the projectile has passed through the abdomen from side to side, the most favorable being those in which the projectile has passed anteroposteriorly through a lateral region of the abdomen. Wounds through the bladder or rectum only, or through both, without injury to any other hollow viscus, could usually be operated on at once, and did remarkably well." (W. M. K.)

Mozingo, A. E. The surgical treatment of empyema by a closed method. Am. Jour. Med. Sc., May, 1921.

This article is based on a series of 138 cases, 45 acute and 93 chronic, treated by the writer, with a mortality of less than 2 per cent, when he was in charge of the empyema wards at Walter Reed General Hospital, and Base Hospital, Camp Pike, Ark. The writer devised what may be termed a closed method of operating for empyema in which he inserts a single rubber tube into the pleural cavity, air-tight and maintaining negative pressure, through which the pleuritic fluid is removed and an antiseptic fluid injected.

The technique of his method as applied in acute cases is as follows: The place of election for operation is the eighth interspace in the postaxillary line. A diagnostic puncture at this point having revealed fluid containing microorganisms, the operation is performed at once regardless of the condition of the patient or stage of pneumonia. Care must be taken to prevent wounding the lung. Two cubic centimeters of 0.5 per cent procain is sufficient for local anesthesia. The cannula surrounding the trocar should be just large enough to admit snugly a standard Carrel tube.

"At the site of operation, a stab not more than 5 mm. in length, through the skin only, is made with a curved bistoury. The cannula is smeared with vaseline to prevent the edges of the tiny wound from clamping it. The patient should have the arm and shoulder raised, take a deep breath and hold it, thus separating the ribs as the trocar is inserted. The needle puncture, skin stab, and insertion of the trocar can all be done in less than a minute.

" The tube should be about 15 inches long, seamless, and have from 5 to 10 fenestræ, about 3 mm. in diameter and 1 cm. apart, within the pleural cavity to facilitate the removal of fluid when fibrin clots are present. When the trocar is removed, instantly the rubber tube is inserted through the cannula, which is now removed, leaving about 6 inches of the tube outside the chest.

" The tube is held air-tight by the contracting wall of the wound and may be connected with a Potain aspirator or the fluid may be removed by a half-ounce bulb syringe, which is used in giving the treatments. Should the respiration become embarrassed from too rapid removal of the fluid, it is advisable to stop a moment or inject 200 to 400 c. c. of Dakin's solution before continuing the removal. If the patient has a high temperature, with active pneumonia, normal saline is used to cleanse the cavity instead of Dakin's solution. This is done by refilling the cavity nearly one-third and agitating the fluid in the cavity by quick compressions and expansions of the bulb.

"The small dressing permits free chest expansion. A No. 00 safety pin is thrust through the edge of the tube. Two thin pads of gauze, each 1 inch square, split to the center, are placed over and under the pin. A pad 2 inches square of 12 layers of bandage gauze, with a hole in the center, made by a pointed and rounded instrument, and never cut, so as to admit the tube snugly, is then applied. Four strips of adhesive, each $1\frac{1}{2}$ inches wide and $3\frac{3}{8}$ inches long, are applied so as to make the finished dressing square. This dressing will frequently last several days, as there is seldom any soiling around the tube unless the incision was made too large or the patient have a very persistent cough, which should be controlled if possible. Should the dressing become soiled a razor blade is best to cut the dressing

from the tube. Usually it will suffice to loosen one side of the dressing, change the two small pads, and apply a new strip of adhesive. The patient can lie in any position without discomfort or danger of the clamps or tube becoming loose.

"Each patient should have his individual tissue forceps, syringe, and Dakin's solution in a wide-mouth bottle where the syringe is kept between treatments. The forceps facilitates handling the tube in preventing air from entering during treatment and makes the wearing of gloves unnecessary. The end of the tube is kept sterile by being capped with the rubber from a medicine dropper held on by a Daeffenbaugh clamp, a spring clamp, or a bulldog clamp, which maintains the negative pressure.

"In giving the treatment it is best that no air enter. The tube is first compressed with the tissue forceps, the clamp and cap removed, the nozzle of the syringe inserted with the bulb compressed and the secretions aspirated. From 50 to 200 c. c., depending on the size of the cavity, of Dakin's solution are now injected and agitated. This is removed and the process repeated until the return is clear. An amount equal to about one-fifth the original capacity is now injected and left in from 5 to 30 minutes, then removed, and the maximum negative pressure reestablished. The treatments usually are given every three to five hours by day and once or twice at night until the pyogenic membrane and fibrous exudate have been dissolved, a process taking from 2 to 14 days, depending on the kind of infection, duration of case, size of cavity, and the general condition of the patient. Subacute cases will tolerate more vigorous treatment, while cases with active pneumonia should be irrigated only every four to eight hours until the symptoms subside.

"Glass piston syringes should not be used; unlike the bulb syringe, they are expensive, break easily, troublesome to sterilize, and difficult to handle.

"The suction power of the bulb syringe will lift water to a height of 8 feet in a 6 mm. tube. That it will prevent pneumothorax is clearly shown by a radiogram taken just before and after negative pressure is established. Very little suction is required to expand the lung, and frequently the patient can not endure the pain caused by the maximum negative pressure of the bulb.

"When the tube is purposely opened, air immediately enters as the lung collapses to a certain degree, which depends largely on the adhesions and size of the cavity. If air so admitted is aspirated, the number of bulbs of air removed counted, and the whole process repeated, the number of bulbs of air removed will invariably be the same; furthermore, if after a maximum negative pressure is attained and any known number, say 5, 15, 30, bulbs of air are injected into the cavity and the process reversed, the number of bulbs of air aspi-

rated will always correspond with the number injected. The same is true if a liquid is used instead of air, thus proving conclusively that the empyemic cavity can be entirely emptied of either air or fluid. The same is true regardless of the position of the patient or whether the tube is inserted at the most dependent part of the cavity.

"That negative pressure is maintained for several hours is shown by the sound of air rushing into the cavity when the tube is left open and by the patient feeling a change of pressure; or if the tube is connected to another tube leading into a bottle containing Dakin's solution, the solution will be drawn into and fill the cavity.

"When a large empyemic cavity is thoroughly cleansed and 150 c. c. of Dakin's solution injected and kept agitated, a specimen withdrawn at the end of 1 minute will usually test about 0.38 per cent, and after 5 minutes will usually test about 0.07 per cent.

"In cleansing the empyemic cavity it is not essential that the sodium hypochlorite solution be 0.47 per cent, as 0.6 per cent can be used for a reasonable time with safety in the pleural cavity. With such a wide margin it is a simple matter for those who do not have the usual facilities for making and testing Dakin's solution to make up a solution sufficiently accurate from the various commercial products. Hypochlorite is used now and found to be both convenient and effective.

"After the amount of secretion and sediment have been greatly reduced, usually in 4 to 10 days, and smears and cultures are negative or nearly so, instead of continuing the treatment as before one should change to and inject a 24-hour-old solution of 2 per cent dilution of liquor formaldehyde in glycerine once daily for the following reasons:

"1. Complete sterilization is attained in from three to seven days, and the tube can be removed before the cavity is completely obliterated.

"2. There is less discomfort to the patient and his sleep not disturbed.

"3. The cavity is made to develop a tolerance for an antiseptic, which antiseptic is advisable to leave in the cavity when the tube is removed to prevent recurrence.

"4. The resultant secretion following the injection of the formaldehyde solution forms unfavorable media for bacterial growth, and when sterile will be readily absorbed and the cavity obliterated.

"The first two or three injections, which should not be over 5 c. c., will usually cause a rise of temperature, and for this reason should not be used too early in acute cases. The amount may be increased up to 15 c. c., but larger amounts are not necessary. Before each injection the cavity is given the usual treatment with Dakin's solution. If there is much sediment present the regular two-hour treatments with Dakin's solution should be given during the day and the formaldehyde solution treatment given once for the night.

"It has been observed that both smears and cultures sometimes will remain positive for organisms for several days after beginning this treatment, even when the secretion gives a positive test for formaldehyde. There will be, however, a gradual decrease in the number of bacteria in both smears and cultures, and sometimes the latter becoming negative first.

"*Removal of the tube.*—The original tube is not removed until the case is completed. Just before the tube is removed the cavity is given a thorough treatment with Dakin's solution and from 5 to 10 c. c. of formaldehyde solution are injected and left in the cavity. The dressing should first be removed and the skin cleansed with ether. An iodine swab is inserted in the sinus and rolled around the tube. The finger 1 inch from the sinus will compress the sides of the sinus during and after the tube is quickly removed to prevent air from entering. The sinus is again treated with an iodine swab, the field cleansed with alcohol, and the sinus closed with three wide strips of adhesive 6 inches long. Sometimes it is well first to make two folds of skin over the sinus or apply a tiny alcohol pad. The second or third day it is well sometimes to remove the adhesive, treat the sinus, and apply a similar dressing."

Regarding this method of treating empyema, the author has come to the following conclusions:

1. Early operation by the closed treatment method has the following advantages:

(*a*) It can be done, regardless of the stage of pneumonia or serious condition of the patient, without the least shock or collapse of the lung.

(*b*) It provides complete evacuation of the empyema cavity, relieves cardiac and respiratory embarrassment, and prevents the absorption of toxins and the usual resultant complications.

(*c*) It lessens the usual thickening of the pleuræ and prevents the lung, compressed by the exudate, from becoming fixed in compression.

2. The closed method has the following general advantages:

(*a*) Productive of great economy of time, labor, and dressing material.

(*b*) Causes the minimum pain and discomfort to the patient.

(*c*) The dressing is small, lasts several days, without skin irritation, and does not constrict the chest.

(*d*) Uncomplicated cases of empyema are not kept in bed.

(*e*) Cases are less likely to have recurrence, become chronic, or need a secondary operation.

(*f*) The constant negative pressure gives maximum expansion of the lung.

(*g*) The scar is very small, and there is no chest deformity.

(*h*) Practical in the home and in country practice.

(*i*) The postoperative treatment in greater part may be done by a nurse or a properly instructed member of the family.

(*k*) Bacteriologic and roentgenographic laboratories, while always to be preferred, are not absolutely essential.

(*l*) The mortality is lower than by any other method.

(*m*) Can effect cure in acute bilateral empyema, both sides being operated at the same time, with acute bilateral pneumonia present, which treatment is impossible by the open method.

3. Dakin's solution, because of its great solvent and bactericidal action, is the most nearly ideal solution to use in the preliminary treatment of the empyemic cavity to dissolve the fibrinous exudate and partially sterilize the cavity.

4. Liquor formaldehyde in glycerine, 2 per cent dilution, is the best solution to use in the empyemic cavity after the preliminary treatment with Dakin's solution to complete sterilization, shorten the course of treatment, and prevent a recurrence.

5. Smears and cultures after the formaldehyde solution treatment is begun will each show a rapid decrease in the number of bacteria, which are sometimes found two or three days in the smear after the culture will be sterile.

6. Bronchial fistulæ are more common than is generally suspected. With this complication salt solution should be used in amounts as large as possible and not cause the patient to cough.

7. A hypochlorite solution of increased strength over Dakin's solution in both alkalinity and available chlorin can be used in the empyema cavity with safety.

8. The available chlorine in Dakin's solution after injection into the empyemic cavity rapidly decreases. The strength after one minute averaged 0.38 per cent and after five minutes 0.07 per cent.

9. Dakin's solution can be made with sufficient accuracy from various commercial products by those who do not have the usual facilities for making and testing this solution.

10. The progress of acute cases when less frequent treatments were given indicates that cures can be effected in a little longer time by giving only one to three treatments daily.

11. Cases becoming chronic following open operation generally can be cured in a comparatively short time by instituting the closed method treatment, so making unnecessary a major secondary operation of the Schede, Eastlander, or Delorme type. (W. M. K.)

Eising, E. H. Willems' treatment of knee-joint injuries. New York Med. Jour., May 18, 1921.

The Belgian surgeon, Willems, in 1915 advocated the treatment of joint injuries which now bears his name. He applied the principles of debridement and primary suture to joints; but to this he added the revolutionary principle of immediate postoperative active motion. His early results were so successful as compared with the older methods of drainage and fixation that he was soon led to lay down the following sets of rules for the treatment of penetrating wounds of joints and of the knee joint in particular:

1. X-ray, to determine presence of fracture and location of foreign body.

2. Debridement of all damaged tissues surrounding the wound, external to the opening in the capsule of the joint, and removal of all blood clot in fascial planes.

3. Resterilization of all instruments before entering the joint cavity.

4. Removal of lacerated edges of synovial membrane, and opening joint sufficiently to proceed with intra-articular manipulations.

5. Removal of foreign body, clothing, and detached bone fragments. If the foreign body is imbedded it is chisseled away, following the tract to its end and removing all devitalized bone surrounding the tract. Manipulations are completed without putting the fingers in the joint cavity and as quickly as possible, because exposure and drying of the synovia conduces to ankylosis.

6. The joint is then washed out with nonirritating solution, such as Dakin's, or salt solution, followed finally by flushing with pure ether.

7. The joint capsule is then closed with plain catgut. Unless the effusion into the joint is frank pus, as in neglected cases, the synovial membrane is completely closed, disregarding the length of time that the injury has existed. The tissues external to the closed capsule need not be closed and are better left open, if the injury has existed longer than 12 hours. The external wound is loosely packed, and a dressing applied in such manner as not to interfere with active motion which is soon to be practiced.

8. As soon as the patient is sufficiently out of the anesthetic active motion is begun with the patient still lying in bed. Active motion is repeated every two hours during the day and night, and is considered one of the most important parts of the treatment in order to prevent ankylosis. Any interruption of the active motion sets the patient back and conduces to ankylosis. The active motion is accomplished with astonishingly little pain which soon disappears entirely.

The author tells us that "the management of the frankly septic cases, proved so by the presence of pus and by bacterial examination, is conducted in the same manner, with the exception that no attempt is made at primary suture. Neither the capsule nor the extra-articular structures are closed in any part. External and internal incisions open the joint on either side of the patella, and the joint is flushed with Dakin's solution, followed by ether. If tubes are employed at all they should not enter the synovial cavity. The external wounds are lightly packed with gauze. Active motion is begun as soon as the patient is sufficiently out of the anesthetic, and repeated day and night every two hours.

"The following day the patient is encouraged to walk without the use of crutches. This, of course, is not possible in all cases. Drainage is remarkably accelerated by the active motions, and on walking the purulent discharge is further forced out of the joint, the pus literally pouring out of the wound.

"The joint cavity is irrigated daily with Dakin's solution. After a week or 10 days the discharge becomes serous in character, and the wound may then be sutured. (W. M. K.)

SHAW, T. B. **Some observations on primary venereal sores.** Jour. Roy. Naval Med. Service, London, July, 1921.

In this article Surgeon Commander Shaw, Royal Navy, maintains that in no case should a patient suffering from a primary venereal sore be treated specifically until it has been demonstrated either

clinically or microscopically that such a sore is syphilitic. Such a procedure, in his opinion, could only be justified in those cases with sores which are clinically doubtful, and where the dark-field method for the examination of the serum of the sore for spirochætes is not available. With dark field illumination a large percentage of venereal sores can be diagnosed accurately as chancroid or primary syphilis as the case may be.

The author considers prophylaxis at the time of exposure to infection and early diagnosis in all cases of venereal sores to be the most important weapons which can be used in any campaign against syphilis. He advocates the venereal prophylactic packet and emphasizes the importance of applying the calomel ointment before coitus as well as immediately afterwards. On the African station, where syphilis is very common, no venereal sores have been contracted by the men who have used the prophylactic packet as directed; of 30 cases of venereal sores which he discusses, none had made use of the preventive ointment.

He suggests the following procedure in cases of primary venereal sores:

(1) All sores to be treated with saline dressings until diagnosed.

(2) When sores are clinically specific, begin salvarsan treatment at once.

(3) When sores are atypical of syphilis, examine by the dark-field method on at least three occasions on alternate days.

(*a*) If *T. pallidum* have been found, treat accordingly.

(*b*) If the diagnosis is chancroid, watch the case for three months to confirm this diagnosis, and have a Wassermann test carried out on three occasions at monthly intervals, the first test to be done one month after the appearance of the sore. (W. M. K.)

Bell, G. **Resection of the small intestine for war wounds.** Jour. Roy. Army Med. Corps, London, May, 1921.

The author, who served for three years as surgical specialist to a casualty clearing station in France, gives the following general indications for resection of the small intestine following gunshot injury:

(1) Complete division of the gut in one or several places, as frequently resulted from machine-gun or rifle-bullet wounds.

(2) Multiple wounds riddling a section of bowel, and especially when the lesions affected the mesenteric border.

(3) Damage to the mesentery of such extent as likely to endanger the vitality of the associated gut.

(4) Obvious gangrene of a damaged area—a rare occurrence.

(5) Severe multiple perforations involving possibly a considerable length of gut, necessitating much time spent in repair and likely to leave the restored part much lowered in vitality and unlikely to resume its functions. This is the class of case in which difference of opinion as to the best line of treatment was most likely to occur.

The strongest argument against resection undoubtedly is the amount of shock produced, and every care must be taken to guard against it by maintaining body warmth, by the use of large incisions to reduce manipulation and evisceration to a minimum, and by speedy yet thorough operating.

His experience leads him to the following conclusions:

The mortality rate of gunshot wounds of the small intestine *submitted to operation* and requiring resection will be about 50 per cent, usually more than less. In uncomplicated cases it may fall, under very favorable circumstances, to 25 per cent, while in complicated cases, and especially those associated with damage to the pelvis and pelvic viscera, it may rise to 75 or even 80 per cent. The mortality will be considerably greater in winter owing to the lethal effects of wet and exposure to cold and to the greater incidence of chest complications after operation. Bell would regard a recovery rate of one in three as very satisfactory under all seasonal conditions. The influence of the distance of the casualty clearing station from the firing line may be stated paradoxically as follows: The nearer the operating station to the firing line, the greater the operative mortality, but more cases will arrive fit for operation and more will be saved.

The selection of cases for resection depends to some extent on the bias and judgment of the individual operator.

The precise length of gut resected up to a limit of, roughly, one-fourth of the total length of the small intestine is not of major importance.

End-to-end union is the method of choice, but under certain circumstances lateral anastomosis may be preferable.

Emptying the upper segment of bowel, especially when distension has already set in, is of the greatest value and illustrates a cardinal principle in abdominal surgery. This and the occasional choice of lateral anastomosis both aim at the avoidance of distension and paralysis of the upper segment.

Hemorrhage is the most potent factor in causing a heavy primary mortality, and blood transfusion is of the greatest value in saving desperate cases brought to death's door by profound bleeding. This life-saving measure should prove of equal value in abdominal emergencies associated with grave hemorrhage in civil practice. (W. M. K.)

CUMMINS, S. L. **Tetanus in the British Army during the European War.** Jour. Roy. Army Med. Corps, London, May, 1921.

The conclusions which Colonel Cummins would draw from the information gained upon the subject of tetanus in the late war are as follows:

(1) The almost universal use of antitoxin for prophylactic inoculation has greatly diminished the incidence of tetanus as a complication of war wounds.

(2) There is reason to hope that, by following up and applying the new knowledge gained by Dr. Tulloch as to types of tetanus bacilli, it may be possible to still further increase the prophylactic efficacy of antitetanic serum in the future.

(3) The prophylactic use of antitoxin has not only reduced the incidence of tetanus, but has also led to a modification of the clinical type of the disease. Tetanus in inoculated persons tends to assume a milder form characterized by a longer incubation period and a greatly decreased case mortality. "Local tetanus," without trismus, is common.

(4) The improvement in surgical technique, notably the introduction of early excision of wounds, has favorably influenced the incidence, severity, and mortality in tetanus cases.

(5) There is as yet no statistical evidence to show that antitoxin has been valuable in the treatment of tetanus.

(6) Good results from serum therapy have been claimed by many surgeons, and recent experiments on animals show clearly that under controlled conditions serum therapy can cure tetanus even though administration had been withheld until the onset of spasm. It is therefore advisable to give every tetanus patient the chance of benefit from specific treatment.

(7) If serum is given, it should be given in large doses and as early as possible after onset. Intrathecal injections should be given, and these should be supplemented by intramuscular and subcutaneous inoculations. (W. M. K.)

TROPICAL MEDICINE.

MARSHALL, C. H. **New method of treatment of trypanosomiasis.** Jour. Trop. Med., June 16, 1921.

Based on the theory that some of the parasites are protected from the action of drugs given intravenously by assuming a secluded position in the central nervous system, the author has formulated a treatment of sleeping sickness by injecting blood serum into the spinal canal. This serum was in most cases obtained from the patients from

one-half to three hours after intravenous injection of neokharsivan, in several cases no intravenous injection was given, and in one case serum from another previously treated patient was used. This blood serum, he suggests, contains some trypanolytic antibody, which the cerebrospinal fluid, cut off from the blood stream by the disease, does not contain. Injection of blood serum containing the trypanolysin into the spinal canal is sufficient to kill the parasites either directly or by stimulating the formation of further antibodies.

The results of such serum treatment of over 50 cases appear to be better than any of the results hitherto obtained by repeated intravenous or subcutaneous injection of salvarsan, atoxyl, antimony, or other preparations. In the first case so treated only 20 minims of blood serum, obtained three hours after an intravenous injection of neokharsivan, was injected into the spinal canal. No other treatment was given. Twenty-seven months later she was quite well. Her blood and cerebrospinal fluid were negative and the glands in her neck, which had completely disappeared soon after the injection, had not reappeared. (E. U. R.)

McDonald, W. M. **Some aspects of differential diagnosis in tropical fevers.** Jour. Trop. Med., June 1, 1921.

Diagnosis of malaria is often difficult because a large proportion of cases dose themselves with quinine for days before the doctor is called and in a certain proportion of subtertian cases the parasite is very rarely found in the peripheral blood. The finding of pigmented mononuclears does not show that the patient is suffering from malaria, but that he has suffered from it. Great care is needed to distinguish between true pigmented mononuclears and the many mononuclears and large lymphocytes showing granules in the cytoplasm found in other diseases. During a malarial attack the large lymphocyte is markedly increased rather than the true large mononuclear.

The diagnosis between paratyphoid fever and subtertian malaria most frequently is confusing.

His diagnostic pointers are summarized thus:

I. Absence of eosinophiles combined with leucopenia and a high Arneth index	Typhoid, paratyphoid.
II. Increase of large lymphocytes. Decrease of small lymphocytes and polynuclears. Eosinophiles normal. Anisocytosis and "brassy" cells. Arneth index normal or low	Malaria.

III. Polynuclear leucocytosis 80 per cent or over	Septicæmia, abscess, pneumonia, meningitis.
IV. Moderate increase of polynuclears and eosinophiles. No anisocytosis	Filaria.
V. Apparently normal blood picture with high Arneth index	Pulmonary tuberculosis.
VI. Marked eosinophilia	Ancylostomiasis and other worm infections.

(E. U. R.)

SANDERS, A. A., and PRISTON, J. L. **Schistosomiasis in the Yangtse Valley.** Jour. Roy. Naval Med. Service, London, July, 1921.

The authors report eight cases of infection with *Schistosoma japonicum* contracted by officers of H. M. S. *Hawkins* while wading in the marshes adjacent to the banks of the Yangtse River on a snipe-hunting expedition.

Each patient after an incubation period of about two to three weeks presented, more or less, the following symptoms: Headache and malaise, slight sore throat and conjuctivitis, followed by some flatulence and abdominal distention, a persistent urticaria, diarrhea, and enlargement of the liver and spleen. Each patient had fever, lost weight, and experienced extreme lassitude, with pain the back and limbs.

Examination of the blood showed an eosinophilia amounting to from 50 to 65 per cent. Ova of the trematode were found in the feces in each case.

The authors used novarsenobillon intravenously in three cases without apparent effect. One case was treated with antimony tartrate intravenously, as recommended by Christopherson in the British Medical Journal, October 18, 1919, with some apparently beneficial effect.

As many ships of the United States Navy have occasion to go up the Yangtse, the liability to this infection should be kept in mind, and the officers and members of the crew warned of the danger of wading or swimming in the river. In January, 1914, Assistant Surgeon R. H. Laning, U. S. Navy, reported in the UNITED STATES NAVAL MEDICAL BULLETIN a series of cases observed on board the U. S. S. *Quiros* while serving on the Yangtse.

In some of Laning's cases the infection occurred while wading and in others from the river water used in washing down the decks of the vessel. (W. M. K.)

KOFOID, C. A., and SWEZY, O. **On the prevalence of carriers of Endamoeba dysenteriae among soldiers returning from overseas service.** Am. Jour. Trop. Med., January, 1921.

Medical literature of the last century bears witness to the ravages of dysentery in our Civil War and thereafter and of the efflorescence of dysentery and liver abscess in the United States after the Spanish-American and Philippine Wars and in Germany after the return of the troops from the Boxer expedition. The recent World War has afforded unprecedented facilities for the appearance of epidemics of dysentery and for the establishment of carriers.

Examination of 2,300 soldiers returning from overseas in Debarkation Hospital No. 3, at New York, revealed that 66.9 per cent were infected with intestinal parasites and in 297 (12.9 per cent) *Endamoeba dysenteriae* were found. These results rested, in the main, on single examinations. Infections were by no means confined to men from the front. Very few of them had dysenteric symptoms at the time of examination. Many, but not all, reported a history of diarrhea or a typical dysenteric attack, often recurrent.

It is evident from investigations here and in European laboratories that the war is returning into civil life great numbers of men who are carriers of pathogenic entamoebae.

It is noteworthy that infections with some of the other intestinal parasites are also increased in overseas men as compared with those in home service.

Cases of amoebiasis may exhibit abscess of liver, lungs, or brain, inflammation of the appendix, enlarged spleen resistant to quinine, long bone and joint pains, and obscure and rebellious types of skin infections.

Investigations also show that a larger number of carriers than has hitherto been suspected exists in the normal population in this country.

Increased attention is called for in all obscure intestinal cases to the possibility that *Endamoeba dysenteriae* is the etiological factor or accessory to the disease. (E. U. R.)

ALLMAND, D. **Liverpool School of Tropical Medicine, Scientific Record.** Ann. Trop. Med. and Parasit. April 27, 1921.

The Liverpool School of Tropical Medicine was founded in 1898 by the late Sir Alfred Lewis Jones, K. C. M. G., a prominent Liverpool shipowner. The school turned its attention early to research and in the summer of 1899 the first of its expeditions was despatched to Sierra Leone. During the next 14 years, or until the school's activities were interrupted by the World War, funds were collected to

equip and maintain more than 30 expeditions to the various tropical regions, including West and Central Africa, Brazil, and the West Indies.

In 1906 the school issued the first number of the Annals of Tropical Medicine and Parasitology. This publication had been preceded by a series of 21 Memoirs, mostly reports of the school's expeditions. Miss Allmand's article is replete with references to the school's publications and the record of research work of the school is dealt with under subjects. No attempt at a critical estimate has been made.

Malaria and sanitation.—The first expedition left England in July, 1899, for Sierra Leone, under the direction of Major Ross, for the purpose of studying malaria in man. A report of the work accomplished was published in 1902 as Memoir II. The investigators discovered two species of Anopheles in Freetown, namely, *A. funestus*, Giles, and *A. costalis*, Loew, and by dissection established the presence of blasts (sporozoites) in them. They pointed out the difference between Culex and Anopheles, and studied more especially the bionomics of the latter. At Freetown 6 of 29 Anopheles dissected showed parasites. Seventeen Culex gave negative results.

In 1900 a third malaria expedition was sent to Nigeria. This expedition, which was composed of Drs. H. E. Arnett, J. E. Dutton, and J. H. Elliott, spent six months in that country and in Memoirs III and IV reports were published of the work done, the former relating to malaria and the latter to filariasis. Seven of 281 Anopheles dissected at Bonny were found to be infected with malaria. "The observation made by Koch and by the Royal Society's Commission that native children are infected with malarial parasites to a large degree was confirmed. * * * It was also proved that quartan and simple tertian parasites exist in West Africa, a fact contrary to the experience of the Royal Society's Commission of the previous year. The bionomics of Anopheles were studied still further and a series of experiments in propagation carried out, confirming and elaborating the discovery of the previous expedition that the female mosquito requires a meal of blood both for fertilization and for the development of the ova. In their recommendations concerning prophylaxis they advocated (1) the segregation of Europeans at a distance of about half a mile (a principle already put forward by the Royal Society's Commission on Malaria, also at work in West Africa) and (2) the surface drainage of areas around their quarters. In an appendix they gave charts and descriptions of cases of hyperpyrexial fever, first described by Thompstone and Bennett. The hyperpyrexial stage lasts one to three weeks and is followed by very extended lysis. An exhaustive account was given in the second report (Memoir IV) of the mouth parts of the female *A. costalis*, and,

in an appendix by Theobald 25 mosquitoes were described of which 9 were new species, namely, *Stegomyia irritans*, *S. nigricephala*, *Culex duttoni*, *C. decens*, *C. pruina*, *C. invenustus*, *C. nebulosus*, *C. rima*, and *C. invidiosus*.

"In June, 1901, Major Ross and Dr. Logan Taylor went to Freetown to organize an antimosquito campaign. Reports on the progress of this campaign were published as Memoir V, parts 1 and 2, and later Ross issued a small book, Mosquito Brigades, and How to Organize Them.

"In September, 1901, Dr. Dutton went to the Gambia and inspected the conditions of health there, with the result that the colony organized measures similar to those in operation at Freetown (Memoir X). About 32 per cent of the infections examined showed quartan parasites, and about a third of the malignant tertian cases showed crescents. The simple tertian parasite was found three times only.

"Dutton noted the universal infection of canaries with Halteridium, which was also found in other birds.

"Of 24 *A. funestus* dissected, one contained sporozoites and one zygotes.

"*A. costalis* was found breeding in boats, street drains, wells, tubs, and barrels, and in tidal water containing 1.7 per cent salt, together with *C. thalassius*. It would appear that *A. funestus* and its varieties are rural mosquitoes, while *A. costalis* is essentially town-bred and capable of utilizing any small collection of water for breeding purposes."

"It was during his researches into the blood parasites of the Gambia that Dr. Dutton made a discovery of the highest scientific importance, namely, the identification for the first time of a trypanosome in the blood of a man, a patient of Dr. Forde. This parasite was subsequently shown to be the cause of sleeping sickness and was named *Trypanosoma gambiense*, Dutton, 1902."

"In September, 1902, by request of the Suez Canal Co., Maj. Ross went to Ismailia to investigate the causes of the prevalence there of malaria, and to recommend measures for its prevention. Anopheles and Culex were found breeding in water containing 0.9 per cent of salt. He concluded that the majority of Anopheles which caused malaria in Ismailia came from the marshes in immediate proximity to the town. Prophylactic measures based on his recommendations were commenced immediately. (Memoir IX.) In February, 1904, 16 months later, Prof. Boyce visited Ismailia; from statistics furnished in his report (Memoir XII) it appeared that the number of cases of malaria had fallen from 1,551 in 1902 to 209 in 1903."

"Ross and D. Thomson, working in Liverpool, published a paper entitled 'Some Enumerative Studies on Malarial Fever.' Some of the conclusions were: (1) No fever exists unless the parasites exceed from 500 to 1,500 per c. mm.; (2) the parasites tend to remain continuously in the blood in small numbers between the febrile relapses; (3) close correlation exists between the number of parasites and the amount of fever caused by them; (4) studies on quinine gave a numerical estimate of its effect, a few days' use of the drug reducing the parasites by from 50 per cent to 80 per cent; (5) crescents apparently require 8 to 10 days for development; quinine affects their numbers only by destroying the generating cells. Thomson, who subsequently investigated the life history of crescents, concluded that these do not live for more than a few days in the peripheral blood. They are replenished from surviving asexual forms, and quinine has no action on crescents but only on the asexual source of supply. He concluded that administration of quinine in doses of 20 grains daily for three weeks is almost certain to destroy both the asexual and sexual parasites. In a study of the leucocytes in malarial fever he stated that malaria could be diagnosed by the leucocytic formula.

"In 1912 J. G. Thomson and McLellan confirmed Bass's observations on the cultivation of malarial parasites. In 24 hours *P. falciparum* was found to undergo segmentation, the maximum number of merozoites counted being 30. In the case of *P. vivax*, 16 merozoites were produced. These cultures of *P. vivax* differed from those of *P. falciparum* in that there was no tendency to clumping. Further experiments in the cultivation of *P. falciparum* and *P. vivax* were made when it was noted that the optimum temperature for cultures was 38 C."

In 1912 Dr. David Thomson was sent to Panama to study certain malarial problems. He noted that the gametes in malignant tertian malaria develop chiefly in the bone marrow and in the spleen, the period of incubation being about 10 days.

In 1917 the school was asked by the war office to undertake investigations into the treatment of malaria.

"No case was considered to be malaria unless parasites were found. The results of treatment were in all cases controlled by daily microscopical examinations combined with the clinical record.

"*Simple tertian.*—The investigators established: (1) That intramuscular injection of quinine bihydrochloride was an effective method of treating a malarial attack, a matter which had been one of considerable dispute in the medical press just previous to this work. (2) That for the palliative treatment of malaria—that is, for keeping a person free from relapses over long periods—it was better to give a

certain total amount of quinine on each of two consecutive days than on each of six days in the week: Thus 60 grains administered as 30 grains for two days gives a better result than the same amount administered as 10 grains for six days. (3) The best palliative result was obtained by administration of 45 grains on each of two consecutive days weekly over a period of two months. (4) They found that a certain treatment may give a certain 'curative' result on one occasion, while the same treatment repeated on another occasion might give a quite different result. (5) Novarsenobillon was found to be as efficacious as quinine in the treatment of paroxysms, but its curative effect, like that of quinine, was practically nil. (6) The best 'curative' result was obtained by the administration of *Liquor arsenicalis*, minims 30, daily over a period of eight weeks in combination with two initial intramuscular injections of quinine bihydrochloride, grains 15, on two days only."

"The intravenous injection of quinine was found to have no real curative effect."

The relapse period after treatment of 800 simple tertian cases was noted. Of those patients that relapse the majority do so in the first 20 days after cessation of treatment.

"*Malignant tertian.*—Neither a single nor a series of six intravenous injections of quinine bihydrochloride (grains 10 to 15) caused the disappearance of parasites, either trophozoities or gamets, from the peripheral blood, whereas in the case of simple tertian the disappearance was rapid. Under quinine treatment, grains 30 to 45 daily, crescents did not persist in the peripheral blood in the majority of cases for more than three weeks. How long they persist without quinine was not determined."

"In 1907 the nineteenth expedition, consisting of Dr. J. O. Wakelin Barratt and Dr. Warrington Yorke, was dispatched to Nyasaland to study blackwater fever. The object of the investigators was to trace out some of the internal processes, the terminal event of which is the appearance of blackwater, believing that in that way many obscure points in connection with the causation and treatment of the condition would be cleared up. The first point was to determine the action of quinine, acid, and alkali upon the red cells during blackwater fever. They found that hemolysins, present in the blood, played no part in the production of blackwater. It was considered that the suppression of urine is due to a mechanical blocking of the renal tubes by the formation of large, firm, coarsely granular casts in the ducts of Bellini. In a later study, on the suppression of urine in blackwater fever, Yorke and Nauss reinvestigated the mechanical theory and found that it is considerably facilitated by any factor which tends to lower the blood pressure, and by that means the

secretion of water by the glomeruli, but that if the blood pressure is kept up by the injection of saline solutions, the tendency to suppression is decreased. Arising out of these latter experiments, the passage of hemoglobin through the kidneys was studied by Yorke, who was led to consider that hemoglobin is excreted by the renal epithelium rather than filtered through the glomeruli, and that the amount of hemoglobin eliminated into the urine is dependent upon the activity of the epithelium lining the renal tubules.

"It was shown by Simpson that the hemoglobin liberated from the red cells in malaria escapes in larger quantities by the feces than by the urine. The study of hemoglobin metabolism in blackwater fever was continued, and a report made on the quantitative estimation of urobilin in the excreta. In later observations on hemolysis in malaria, Simpson concluded that the serum of malarial patients may possess the power of hemolysing normal red-blood cells. The hemolytic effect could not be obtained at all periods of the paroxysm, nor in every case; it appeared to be produced at the period of sporulation, and rapidly disappeared. Simpson and Edie, observing the excretion of urobilin in animals and man, found that an increase may occur after the administration of quinine in doses of 10 to 30 grains a day, and that a similar result follows injection of blood pigment or hemolytic drugs.

"Experiments were devised by Barratt and Yorke for examining the relation of bile pigments to hemoglobin. Experimenting with rabbits, they found that consequent upon intravenous injection of hemoglobin solution there was a distinct and immediate increase not only in the concentration of the bile pigment but also in the amount of bile pigment excreted. Two hypotheses were advanced to explain this increase—(1) that the hemoglobin injected is actually converted by the liver into bile pigment, or (2) that it merely stimulates the liver cells to an increased production of bile pigment.

"Stephens recorded that blackwater fever occurred in 11 of 22 of the United States. * * * An analysis of 95 cases showed that when the blood was examined before the onset of blackwater, malarial parasites were present in 95.6 per cent of cases, whereas on the following day the remarkable fall to 17.1 per cent was the result. On the day of blackwater itself the figure was 61.9 per cent."

"*Trypanosomiasis.*—In view of the great importance of the discovery of the trypanosome in man by Dr. Dutton in 1901, described and named by him *T. gambiense*, an expedition was sent out to the Gambia and French Senegal in September, 1902, in charge of Dr. Dutton and Dr. J. L. Todd, for the study of trypanosomiasis. While these investigators were at work abroad the first case, that of a European who had returned with Dr. Dutton in 1901, remained in

Liverpool, and Dr. Annett infected monkeys and 25 per cent of tame rats successfully, but did not succeed in infecting tame mice, rabbits, or guenea pigs. One of the infected monkeys died, but the other recovered, and no parasites could be found by subinoculation into rats. The results of his work were incorporated in the report of the expedition. (Memoir XI.) On reaching the Gambia, 1,043 natives were examined, the majority of whom were children or young adults and apparently healthy, 6 were found to be infected. Trypanosomes were also found in the blood of a quadroon. Clinical descriptions were furnished in the report of these first 8 cases of trypanosomiasis, of which those of the European and the quadroon terminated fatally after a duration of about 18 months. Of 36 horses examined, 10 were found to be infected with trypanosomes. Transmission experiments were made with *Glossina palpalis* and later with Stomoxys, but with negative results. A series of inoculations were made of the human and equine trypanosomes in experimental animals, the results of which led Dutton and Todd to the conclusion that the parasites were not of the same species; the Gambian horse trypanosome was subsequently named *T. dimorphon.*

"Prior to the return of this expedition, the discovery of trypanosomes in the cerebrospinal fluid of cases of sleeping sickness in Uganda by members of the Sleeping Sickness Commission of the Royal Society caused the subject of trypanosomiasis to assume great importance. At the invitation of King Leopold, an expedition was sent in 1903 to study sleeping sickness in the Congo Free State, consisting of Drs. Dutton, Todd, and Christy. The results of these investigations were incorporated in Memoir XIII, and illustrated the occurrence and distribution of trypanosomiasis, described the symptoms of the disease in all its stages, both in Europeans and natives, and showed how sleeping sickness, so called, is related to trypanosomiasis as a symptom of that disease.

"They first stated that they were unable to find any difference between the trypanosome occurring in cases of sleeping sickness in the Congo and *T. gambiense.* There was a very evident clinical connection between cases with only very slight symptoms (trypanosoma fever) and advanced cases of 'sleeping sickness.' (In 25 of 38 cases they found parasites in the cerebrospinal fluid, adopting Quincke's method of diagnosis by lumbar puncture. They infected rats, mice, rabbits, guinea pigs, and studied the morphology of the Congo and Gambian trypanosome in these animals. They noted that about 50 per cent of such inoculations failed, and that they did not succeed in infecting two dog-faced monkeys (Cynocephalus species).

"In the combined areas of Leopoldville, Boma, Matadi, and the Cataract region, among a total of 1,172 persons examined, 8.8 per

cent were infected, while of these latter 55 per cent had been diagnosed as cases of sleeping sickness. In the Gambia the previous expedition had examined 1,043 natives, of which 6 only harbored trypanosomes, and showed no definite symptoms.

"Numerous lumbar punctures were made, and it was noted that in many cases the trypanosomes never find their way into the cerebrospinal fluid, and in those cases in which they do they are more likely to be found toward the termination of the disease; if they gain access early in the disease, mania and other cerebral symptoms are more likely to be prominent, but their entrance is in no way correlated to the commencement of the fever or other symptoms. In two later papers on gland puncture in trypanosomiasis, the observers favorably compared this with other methods of demonstrating the presence of parasites. Following the work of Greig and Gray, they concluded that by gland puncture cases infected with trypanosomes could be recognized at a much earlier period than hitherto. They also for the first time observed a phenomenon frequently seen in cases of trypanosomiasis, namely, autoagglutination of the red cells. The distribution of sleeping sickness in the Congo was subsequently studied, it being concluded that the increase during recent years was due in a great measure to the increase in travel following the opening up of the country. In a subsequent report the trypanosomiasis of cattle was dealt with. The investigators found that this disease was very widely distributed in the Congo, the infecting parasite being usually *T. dimorphon*. It was also observed that domestic animals probably acquire a relative immunity to some strains of trypanosomes, and may even recover spontaneously. Trypanosomes were found in horses, mules, and donkeys as well as in cattle, and also in *Tragelaphus scriptus*.

"Thomas, assisted by Linton and Breinl, established by a long series of experiments that trypanosomes found in (*a*) the cerebrospinal fluid of Uganda sleeping sickness cases, (*b*) the cerebrospinal fluid and blood of Congo sleeping sickness cases, (*c*) the blood of Congo 'trypanosome fever' cases, and (*d*) the blood of Europeans infected in the Congo were identical in animal reactions and morphology with *T. gambiense* Dutton. It was also found (1) that the periodicity of the parasite is a prominent feature, both in man and beast; (2) that the passing of a strain from a susceptible into a very resistant animal does not attenuate the organism, and that the morphological character is retained after being passed through many hundreds of animals for nearly three years; (3) that the parasites in an animal may sometimes become more virulent, that such a strain may be particularly virulent for one species of animal, and that the more rapid infection is not due to the inoculation of a greater number of parasites than usual. In addition to *T. gambiense*

and *T. dimorphon*, other pathogenic trypanosomes were procured, and comparisons made between the above organisms and *T. evansi*, *T. brucei*, *T. equinum*, and *T. equiperdum*. Cultivation of the different parasites was also undertaken with success. Breinl gave a detailed account of the post-mortem changes in four cases of sleeping sickness.

"Extensive research was conducted into the treatment of trypansomiasis, with the result that two drugs only were found to be of any value in the disease, namely, arsenic and 'Trypanroth.' Thomas introduced atoxyl, a meta-arsenic anilin compound, a drug which causes no pain on subcutaneous injection and may be administered over a period of many months. He stated that it was 'the only remedy at present giving a prospect of a cure.' Although atoxyl would almost invariably cause the trypanosomes to disappear from the peripheral blood, yet since the parasites frequently reappeared, it seemed possible that they might exist somewhere else in the body of their host in a form uninfluenced by the drug. Series of experiments were therefore undertaken by Benjamin Moore and Nierenstein, of the biochemical department, and Todd. They found that in the treatment of rats infected with *T. brucei*, the administration of atoxyl, followed by bichloride of mercury, gave better results than treatment by atoxyl alone."

"In May, 1907, the eighteenth expedition of the school, consisting of Dr. Allan Kinghorn and Mr. R. E. Montgomery, was dispatched to Rhodesia and British Central Africa to study the trypanosomiases of men and animals. It was found that sleeping sickness had already invaded northeastern Rhodesia, the first case being seen in the Luapula division, adjoining the frontier of the Congo. Glossina surveys were made, and the suggestion first advanced that *Gl. palpalis* and *Gl. fusca* were not the only transmitters of the disease, *Gl. morsitans* having also been observed in infected areas. Gland palpations were made in 26,928 natives, of whom 17.05 per cent were found to have palpable glands. The percentage of positive punctures was 77.7. The workers confirmed the belief of Dutton and Todd that gland palpation, combined with puncture, is a most useful measure, being a practical method of isolating infected natives and preventing any rapid extension of the disease. It was found that there were between 50 and 60 known cases of sleeping sickness in the country. The mode of introduction and prophylaxis of the disease were studied, and regulations drawn up by this expedition were adopted and enforced by the Government.

"Concurrently with the research into human trypanosomiasis the expedition pursued an inquiry into trypanosomiasis of domestic stock in northwestern Rhodesia, in the course of which it was established that the disease was very prevalent in that area, and was due to *T. dimorphon*, *T. vivax*, and a trypanosome morphologically allied to

T. brucei. These trypanosomes could be transmitted by *Gl. morsitans*, by *Stomoxys calcitrans*, and by a species of *Lyperosia*. The question of association of big game and *Gl. morsitans* is entirely dependent upon the nature of the country and its flora, that the association with the fauna is largely fortuitous, and that a perpetual supply of mammalian blood is not imperative, at least to its temporary existence."

"In 1911 the twenty-seventh expedition of the school, consisting of Dr. J. L. Todd and Dr. S. B. Wolbach, was dispatched to the Gambia to investigate sleeping sickness.

"In the course of this investigation, 12,298 persons were palpated, and the observers put on record their opinion that gland palpation and puncture was by far the best procedure for the diagnosis of trypanosomiasis. It was found that at least 0.8 per cent of the population of the Gambia was infected with trypanosomes. Strong recommendations were made for the control of the disease in the Gambia, including a continued examination of the whole population, the establishment of villages for isolation, observation, and treatment of cases, and the appointment of a special staff for the administration and execution of these projects.

"In 1911, at the request of the British South African Co., Dr. Kinghorn and Dr. Yorke were sent to Rhodesia (Luangwa Valley) to study sleeping sickness. It was quickly placed beyond doubt that *Gl. morsitans* was the carrier of the human trypanosome. The investigators inoculated rats from 12 cases of human trypanosomiasis, 11 of which occurred in villages in the Luangwa Valley. In every instance they observed the posterior displacement of the macronucleus, characteristic of the trypanosome described by Stephens and Fantham; the animal reactions agreed in all repects with those obtained from infection with *T. rhodesiense*. Elaborate transmission experiments with both wild and laboratory-bred *Glossina morsitans* were successfully carried out in rats and monkeys; the duration of the cycle in the fly (approximately 14 days) was found to be shorter than in experiments of previous investigators with *Gl. palpalis* and *Gl. morsitans*. It was observed that an infected fly retains the power of transmitting the disease during its life, and is infective at each meal, but that mechanical transmission does not occur if a period of 24 hours has elapsed since the infecting meal. Certain species of buck, viz, water buck, hartebeest, impala, and wart hog, were found to be infected with the human trypanosome, as well as a native dog."

The chief reservoir of the human trypanosome was found to be the antelope.

"J. G. Thomson succeeded in cultivating *T. rhodesiense* by the use of a modification of the Novy-MacNeal-Nicolle medium. * * * In a subsequent investigation with J. A. Sinton, Thomson success-

fully cultivated *T. gambiense*, as well as *T. rhodesiense*, the former for a period of 37 days, the latter for 21 days only.

"The thirty-second expedition of the school, consisting of Drs. Yorke and Blacklock, was dispatched to Sierra Leone in 1914. Research was undertaken into the bionomics of *G. palpalis* in Sierra Leone, with special reference to its pupal habits. It was found that the breeding grounds of *G. palpalis* are not so strictly limited to the immediate vicinity of water as had hitherto been believed. Mangrove swamps do not constitute a breeding ground. The pupæ do not hatch when subjected to daily flotation on sea water. The ground around the trunk of oil palms which have not been stripped of their lower petioles constitutes an excellent breeding place for *G. palpalis;* they can breed in localities in which practically the only tree is the oil palm. A study of the food of *G. palpalis* in the Cape Lighthouse Peninsula, Sierra Leone, showed that about 8 per cent of the wild *G. palpalis* in that district contained recognizable red-blood cells, 7 per cent of mammalian origin, and 1 per cent nucleated red cells of unknown origin. Neither shed blood nor other fluid which is exposed (not covered by a membrane) can be imbibed by *G. palpalis.* Fluids, such as solutions of sugar, sodium, chloride, etc., protected by a membrane (e. g., thin rubber sheeting), were taken up, but less quickly and readily than blood. It was thought that in nature *G. palpalis* may, under certain conditions, take up fluids other than blood. The human trypanosome (*T. gambiense*) was discovered in an ox in Sierra Leone, thus demonstrating that domestic stock forms a reservoir for the virus of sleeping sickness."

Yellow fever.—In 1900, the fourth expedition, consisting of Drs. H. E. Durham and Walter Myers, went to Brazil to study yellow fever. Dr. Myers died of the disease in January, 1901, while Dr. Durham, who also contracted it, recovered and published a report of the work of the expedition in 1902.

Relapsing fever and spirochætes.—By the death of Dr. Dutton from tick fever while serving with the Congo expedition, the school suffered the loss of one of its most brilliant workers, who, although only 29 years of age, had already won a recognized position throughout the scientific world. Toward the end of 1904, Dr. Dutton and Dr. Todd had reached Stanley Falls, and they were able to demonstrate independently the cause of tick fever in man, a discovery made a few weeks previously by Ross and Milne in Uganda. Further, they were able to prove the transference of the disease from man to monkeys by means of a particular species of tick. In Todd's report of this discovery (Memoir XVIII) clinical descriptions were given of 12 native and 2 European cases (the last two being those of the investigators themselves), all of whom were infected with a spirochæte, thought at first to be *S. obermeieri.* Observations were made

upon the distribution and bionomics of the human tick in the Congo, and included in the report was a description of *Ornithodoros moubata* by Prof. Newstead.

"Research was proceeding at Runcorn upon material brought back from the Congo by Dr. Todd, while Dr. Breinl, invalided home from the fifteenth expedition, carried out with Dr. A. Kinghorn extensive studies on 'tick fever' and 'relapsing fever.' Observations were made on the animal reactions of the spirochæte discovered in the Congo cases of human tick fever, and brought to England in infected monkeys and ticks. In the course of these experiments, infection was produced not only in monkeys, but also in a horse, a dog, rabbits, guinea pigs, rats, and mice. This fact caused the observers to conclude that the organism was distinct from *Spirochæta obermeieri*, pathogenic hitherto to monkeys only. Further experiments were undertaken confirming this conclusion; and the new species was given the name of *Spirochæta duttoni* (Breinl and Kinghorn, 1906, Memoir XX). Studies were made of this organism (Memoir XXI), in the course of which a clinical comparison was made between African tick fever and European relapsing fever, and the research into the animal reactions of this spirochæte in various animals amplified and completed."

"*Amoebiasis.*—Research into the amoebæ parasitic in the human intestine was undertaken by Fantham, and a study commenced of the life history of *E. coli* as seen in cultures.

"Carter, Mackinnon, Matthews, and Smith conducted extensive researches into the protozoal findings in cases of amoebic dysentery. In their first report they recorded the results of 4,334 examinations of 910 patients suffering from this condition. Protozoal infections were discovered in 44.2 per cent; *E. histolytica* was found in 10.3 per cent of the cases; *E. coli* in 25.4 per cent; *G. intestinalis* in 18.6 per cent; *T. intestinalis* in 1.2 per cent; and *C. mesnili* in 2.7 per cent. Their second report recorded similar examinations of 1,713 cases of dysentery. Stress was laid upon the necessity for repeated examinations of each patient, as cases found negative the first and second times may prove on further examination to be *E. histolytic* carriers. The subject of 'negative periods' (absence of vegetative forms and cysts) in infected cases was also dealt with. A third report of this investigation appeared in Annals, Volume XIII, page 83. Yorke and the above-mentioned observers examined for intestinal protozoa 344 persons who had never been out of England. Of this number 206 were healthy young men of about 18 years of age who had recently entered the army. A single examination of each of these cases revealed the interesting fact that 3.9 per cent were infected with *E. histolytica*."

"*Helminthiasis.*—In 1917, at a veterinary hospital attached to a remount depot in the neighborhood of Liverpool, Yorke and Macfie started an investigation into the parasitic worms causing a heavy mortality amongst horses recently imported from America. The parasites belonged for the most part to various genera of the family Strongylidae, and in the course of their study Yorke and Macfie described eight new species and one new variety, viz., *Cylicostomum longibursatum*, *C. minutum*, *C. pseudocatinatum*, *C. pateratum*, *C. tridentatum*, *C. triramosum*, *Cylindropharynx rhodesiense*, *Gyalocephalus equi and Cylicostomum nassatum*, Looss, var. *parvum*."

"*Filariasis.*—The second part of the Report of the Third Malarial Expedition was devoted almost entirely to Filariasis. Eight new species, found during the examination of a large number of West African birds, were described, namely, *F. eypseli*, *F. spiralis avium*, *F. fusiformis avium*, *F. spiralis avium major*, *F. falciformis*, *F. bibulbosa*, *F. capsulata and F. shekletoni.* Observations were also made on human filariasis in West Africa, it being found that throughout the whole of that area the natives appeared to be infected with *F. nocturna*, *diurna* and *perstans.* With regard to the two first species, the majority of the cases encountered were atypical, in that embryos were either never absent from the peripheral blood, or the maximum did not occur at midday and midnight or thereabouts according to the species. Among the former cases there were many showing decided periodicity, and, among the latter, the hour at which the maximum number was present varied considerably. In some cases two maxima during the 24 hours were indicated. In the examination (day blood) of 390 natives of all ages up to about 18 years, one case only, aged 11 years, was infected. The observers succeeded in infecting *A. costalis* (proboscis) with *F. nocturna.* They considered that the weight of evidence was on the side of the identity of *F. nocturna* and *F. diurna*, but that many points remained to be cleared up before the question could be settled.

Miss Allmand concludes her article by a review of the scientific researches of the school in entomology and protozoology. (W. M. K.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

JENKINS, C. E. **Notes on cultivation of gonococcus.** Jour. Path. and Bacteriol. April, 1921.

The author found whole blood agar most satisfactory. It was made by adding 0.5 c.c. fresh blood to 4.5 c.c. agar in each tube—tubes being kept at 55 C. until blood is added, when they are sloped in the usual manner. The optimum temperature for growth of the

gonococcus was found to be 35 C. to 36 C., in moist air. The moisture was provided by placing a dish of water in the incubator. A note is made of variation of temperature between the upper and lower parts of the incubator. Reaction + 0.4 or + 0.5 was found to be best.

The writer states that various authorities have recommended from 1.2 per cent to 3 per cent agar, but he prefers to test each batch of agar for its "solidity." He does this by placing varying amounts of agar in eight tubes; in the first tube 5 c.c., in the second tube 4.6 c.c., and so on through the series, 0.4 c.c. less of agar in each tube. He adds sufficient hot saline to each tube, beginning with 0.4 c.c. in the second, to make up to 5 c.c. in each tube. He shakes the tubes well and slopes them. The tubes are left for 30 minutes in sloping position and then set upright in order of dilution from left to right for 15 minutes. He marks the tube having most saline but showing no collapse after standing upright. He then selects the third or fourth tube from the marked tube in the direction of least dilution with salt solution.

The batch of medium is then diluted, using pepton with reaction of + 0.5 instead of saline solution. It is said that this gives a medium which is sufficiently soft to permit of rapid growth of the gonococcus. (G. F. C.)

Craig, C. F. **The classification and differential diagnosis of the aestivo-autumnal malaria plasmodia.** Am. Jour. Trop. Med., March, 1921.

This author states that Grassi, Feletti, Mannaberg, Mason, Marchiafava and Bignami recognize two or more species of aestivo-autumnal or pernicious plasmodia.

He presents an able discussion of the evidence that there are at least two distinct forms differing in morphology, in length of life cycle and in clynical manifestations. He uses the name *Plasmodium falciparum* for the form with a life cycle of 48 hours and the name *Plasmodium falciparum quotidianum* for that with a life cycle of 24 hours. The latter he advanced as a subspecies in 1909 and he now considers the evidence almost sufficient to entitle it to rank as a distinct species. (E. U. R.)

Eagleton, A. J., and Baxter, E. M. **The virulence of diphtherialike organisms.** Brit. Med. Jour., May 28, 1921.

The authors offer the following technique, which has been found of great value in the Wellcome Physiological Research Laboratories:

"Two guinea pigs are used for each test; both must be partially white.

"*Protecting dose.*—One animal is given 500 units of diphtheria antitoxin by intraperitoneal injection on the day preceding the test. This animal acts as a control.

"*Preparation of inoculum.*—The test strains and a known virulent diphtheria bacillus are grown 18 hours on Loeffler slopes, emulsified in saline, diluted and standarized by opacity, so that the suspension contains approximately 50,000,000 organisms per cubic centimeter.

"*Injection of suspensions.*—White-haired portions of the guinea pigs are depilated with calcium sulphide paste, and into corresponding skin areas of the two animals is injected 0.2 c. m. of each suspension. The injections are strictly intradermal and at least half an inch apart. On each pair of animals 8 or 10 strains are usually tested, including the control virulent.

"*Following dose.*—Four or five hours later the animal which was not given a protecting dose on the previous day receives 125 units of diphtheria antitoxin intraperitoneally.

"Readings are taken for the next three days.

"In the case of a virulent diphtheria bacillus the control animal shows nothing or a faint transient flush; the other animal shows a definite rose-red swelling, which becomes more marked at each successive reading, and may terminate in slight necrosis. An avirulent diphtherialike organism gives a negative result with both animals. If the test culture is contaminated with streptococci the result may be obscured by a reaction in both animals, but this does not always happen." (W. M. K.)

CHEMISTRY AND PHARMACY.

MASON, E. H. **A note on the absorption of calcium salts in man.** Jour. Biol. Chem., Vol. XLVII, 1921.

Relative to the ingestion of calcium salts as hemostatics, Mason determined the effect upon the calcium of the blood plasma of single 5-gram doses. Calcium lactate (8 trials) produced little increase, either alone, in dilute hydrochloric acid, or in cod liver oil. Calcium chloride alone produces increases of 10 to 40 per cent (4 trials); with dilute HCl, increases of 10 to 20 per cent (2 trials). (C. W. O. B.)

SUMNER, J. B. and GRAHAM, V. A. **Dinitrosalicylic acid: A Reagent for the estimation of sugar in normal and diabetic urine.** Jour. Biol. Chem., 1921, XLVII.

The authors introduce a new colorimetric determination, using dinitrosalicylic acid, for the preparation of which directions are

given. The technique is very simple, except that a control for such substances as uric acid and polyphenols must be made with "low" (definite limit not given) and normal sugar contents, or results may be more than 100 per cent too high. In view of the control, the method probably offers no real *clinical* advantage over the usual Benedict or Folin-Peck methods. With 10 normal urines there were values obtained for total sugar of 0.019 to 0.149 per cent (average of 0.067), for fermentable sugar of 0.019 to 0.109 per cent (average of 0.055), and for unfermentable sugar an average of 0.012 per cent. (C. W. O. B.)

KOBER, P. A., and KLETT, R. E. **Further improvements in the nephelometer-colorimeter.** Jour. Biol. Chem., XLVII., 1921.

"The advantages of the new improvements are: (1) The elimination of the fatigue and annoyance due to stooping to read the scale of Duboscq instruments; (2) an enlarged and well-illuminated scale read through an eyepiece of the same focal length as the telescope; (3) a more convenient position for the milled heads operating the stages allowing for resting of the operator's arms; and (4) a micrometer arrangement for setting the zero point which can be locked in any position." (C. W. O. B.)

DENIS, W. **On the substitution of turbidimetry for nephelometry in certain biochemical methods of analysis.** Jour. Biol. Chem., XLVII, 1921.

Based upon results obtained in three analytical procedures (Lyman's for calcium in blood, Bloor's for fat in blood and milk, and Pouget and Chouchak's strychnine molybdate method for phosphates as modified by Kober and Egerer and Bloor), the author considers the use of the ordinary Duboscq colorimeter, in a dark or semidark room, equal in accuracy to the nephelometer as well as superior, inasmuch as larger variations in concentrations between standard and unknown are permissible and the instrument is more generally available. The first method above permits a variation of 50 per cent if the final volume of 100 c.c. contains 0.75–0.35 mg. calcium; the second a variation of 60 per cent with fatty acid concentrations within range of 8–2 mg. per 100 c.c.; for the third, the optimum concentration is 0.12 to 1.2 mg. H_3PO_4 per 100 c.c. Turbidimetry is already employed by Folin and Denis for albumin in urine, and by Denis and Ayer for cerebrospinal fluid. (C. W. O. B.)

GROSS, E. G., and STEENBOCK, H. **Creatinuria.** Jour. Biol. Chem., XLVII, 1921.

Experimenting upon the pig, it was found that feeding with arginine (or its precursor, casein) augments creatin excretion, as does cystine (if urine remains acid). Ingestion of sheep's thyroid with a nitrogen-free diet caused marked stimulation of creatin formation, which was accentuated upon addition of casein to the diet. Possibly the thyroid mechanism thus explains why protein feeding produces creatinuria in women but not in men. (C. W. O. B.)

MCKILLIPS, G. M., DE YOUNG, I. M., and BLOOR, W. R. **The distribution of phosphoric acid in the blood of normal infants.** Jour. Biol. Chem., XLVII, 1921.

Sex showed but little influence. Corpuscles gave practically adult values, but, in terms of H_3PO_4 in mg. per 100 c. c., the plasma gave the following average results:

	Adult.	Infant.
Total	34.0	29.7
Acid-soluble	11.4	16.5
Inorganic	9.9	9.6
Lipoid	23.5	14.8
Organic	1.5	7.0

(C. W. O. B.)

BLUNT, K. and DYE, M. **Basal Metabolism of normal women.** Jour. Biol. Chem., XLVII, 1921.

The daily variation for each subject ranged from 7.4 to 28.8 per cent. There was no relationship between the minimum pulse rate and the basal metabolism. Menstruation produces no definite change in basal metabolism or in pulse rate. (C. W. O. B.)

STEENBOCK, H., SELL, M. T., and BUELL, M. V. **Fat-soluble vitamine.** Jour. Biol. Chem., XLVII, 1921.

Using rats to determine the relation between the vitamine and yellow pigment, it was found that cod-liver oil has a very high concentration of the former, but very small amounts of the latter. The concentration in butter fat generally parallels the pigment, but not necessarily closely, in which respect they are resembled by beef fat and egg yolk. The vitamine withstands severe methods of saponification, thus indicating that it is not a fat and probably not an ester. (C. W. O. B.)

MEANS, J. H., and WOODWELL, M. N. **Remarks on standards for normal basal metabolism.** Arch. Int. Med., May 15, 1921.

Indirect calorimetry, as a result of the pioneer work of DuBois and his collaborators, has become generally adopted in the last two or three years, in this country at least, as a routine method of labora-

tory diagnosis in certain diseases, especially in those of the ductless glands. As a functional test of the thyroid gland, the level of the basal metabolism is being determined at the present time in many clinics.

Clinicians may well be puzzled in choosing between the several methods that have been proposed for the purpose by various investigators. It is with the hope of throwing light on this phase of the subject that the present communication is made.

METHODS FOR PREDICTING THE BASAL METABOLISM OF NORMAL PERSONS.

Body-surface law.—The search for suitable criteria has centered chiefly about the so-called body-surface law of Rubner. The principle embodied in this law, which is that the basal metabolism is a simple function of the body surface, has been disputed by Dreyer, and as Boothby and Sandiford have recently pointed out, such objections, in a strict sense, are valid. Nevertheless, in a broader sense, Rubner's law has never been disproved, and while it may be true that the basal metabolism is not strictly proportional to, nor, perhaps, determined by, surface area, the fact remains that it is more nearly proportional to area than to any other one factor so far discovered.

DuBois linear formula.—It was to overcome just such faults in formulas that the DuBois formulas were devised. By the first of these, the so-called linear formula, the body surface is calculated from about 19 measurements of the body. The principle is to divide the body into parts and calculate the area of each part from its length multiplied by its average circumference and by a constant. The sum of the parts gives the total body-surface area. The constants for the several parts were derived from the areas of the parts as determined by actual casts. Casts were made of the bodies of 10 individuals of widely different shapes. It was found that the area as calculated by the linear formula varied on an average less than 1.7 per cent from the areas as actually measured from the casts.

Du Bois height-weight formula and chart.—In 1916 the Du Boises brought out a still simpler formula, the so-called height-weight formula. This was worked out from the results obtained in a large series of persons by the linear formula, and enables one to obtain the surface area directly from the height and weight. The height-weight formula, which has been still further simplified into the height-weight chart, is the method in use in most clinics to-day. In this clinic as in other clinics the calories per square meter per hour are compared with the Sage Institute normal standards. These standards have been changed slightly from time to time; the most

recent ones will be found in the paper of Aub and Du Bois published in 1917.

Harris-Benedict prediction tables.—The Harris-Benedict Method takes the form of a series of tables in which are given prediction figures of what the metabolism should be in a normal adult of either sex and of any height, weight, or age. The figures were developed from the data of observations made on 103 women and 136 men at the Carnegie Nutrition Laboratory in Boston.

The Dreyer formulas.—The Dreyer formulas are several. They take into consideration one less factor than either the Du Bois or the Harris-Benedict. The last two take into consideration height, weight, age, and sex. The Dreyer formulas are based on age, sex, and one other factor, either weight, trunk length, or circumference of thorax. Dreyer derived his constants from the Harris-Benedict data.

In predicting the metabolism of normal men it was found that the three methods gave about equally good results; that in predicting that of obese subjects the Harris-Benedict method gave slightly better results than the other two. In the matter of deviations from normal in patients with myxedema, toxic goiter and the like, it was found that the information gained by the three methods was again strikingly similar.

SUMMARY AND CONCLUSIONS.

1. The accuracy of prediction of the basal metabolism of normal men by the Du Bois height-weight surface area method, the Harris-Benedict multiple prediction tables, and by the Dreyer body-weight formula, have been compared. It was concluded that the average deviation was essentially the same by each, though the Du Bois deviations tend to run about two points or more lower than either of the others.

2. The same study was made in a series of six obese subjects. It was found that with them the Harris-Benedict method gave a slightly closer prediction than the other two. In general, however, the deviations by all three methods were within what may be considered a normal limit of variation in all of the six subjects. This furnishes confirmation of the conclusions drawn in earlier papers that there is no fundamental change in basal metabolism in simple obesity.

3. In abnormal subjects patients with hypothyroidism or hyperthyroidism, for example, it was found that the deviations by the three methods were essentially parallel, though on an average the Harris-Benedict deviation tended to be about 6 per cent higher and the Dreyer about 7 per cent higher than the Du Bois. It was pointed out that these differences could be practically abolished by a slight reduction in the Sage standards.

4. It is suggested that although the deviation by the three methods are very similar, nevertheless it is desirable to have uniformity, and that, therefore, the Du Bois method be continued, since it already is in common use and since the others appear to possess no material advantage over it. (J. J. O'M.)

EYE, EAR, NOSE, AND THROAT.

COLLEDGE, L. **Injuries to the ear in modern warfare.** Jour. Laryngol., Rhinol., and Otol., June, 1921.

The author's observations were made from an aural center in an army area. Trench warfare made such a fixed center possible, thus securing early treatment for acute cases, retaining many in the area who would otherwise have been lost by evacuation to a base, enabling slight complaints to be dealt with, and the classification of men as fit for duty, special duty at listening posts, or unfit for front-line work.

Deafness from gunfire was very common among gunners, who constituted a great proportion of the patients. The lesions permitted dividing cases into two classes. First, those with progressive deafness from prolonged exposure to the noise of gunfire, without any visible change but with definite loss of bone conduction. Improvement was slow, partial, and a prolonged rest was really required. Second, those in whom deafness resulted from a single blast without any visible change. These cases recovered more rapidly as a rule, though tinnitus often persisted. In some of the latter cases the drumhead was seen to be spotted with minute punctate hemorrhages.

Primary rupture of the tympanic membrane is much less common and is a more severe injury than is generally supposed. The membrana tensa is more commonly involved. Most ears heal if left alone, but many suppurate, especially if the ear is syringed. If the perforation heals, the hearing is remarkably good, and in some cases perfect hearing resulted even following severe suppuration. This has been explained by Bourgeois as follows: If the tympanic membrane is not torn the impact transmitted along the ossicles to the oval window alone sets up a marked displacement of the labyrinthine fluid with labyrinth disturbances, while if the membrane is torn there is no ossicular transmission and the force falls equally on both oval and round windows, and consequently no disturbance of the labyrinth nor displacement of the fluid results.

Actual malingering is quite uncommon, although exaggeration of deafness is seen. A man with a normal drumhead may have otosclerosis or internal ear deafness, but complete absence of bone conduction is most suspicious, and if combined with a furtive expression and a shifty demeanor is highly characteristic. (L. H. C.)

FAULDER, T. J. **Injuries to the ear in modern warfare.** Jour. Laryngol., Rhinol. and Otol., June, 1921.

An accurate determination of the effects of modern warfare upon the hearing and the ears is rendered difficult because of the frequent lack of careful records of the aural condition of men on enlistment.

The author, in nearly 20 years' service with artillery, including three years of the Great War, saw but one case of rupture of the drumhead as a result of gunfire. Hemorrhage from the ears, usually slight, was not uncommonly seen, and it was noted that granulations and exposed mucous membrane could be made to bleed as a result of excessive stimulation. He emphatically states that the presence of blood in the meatus is not sufficient evidence to diagnose rupture of the drumhead.

Large numbers of men got impaired hearing, the degrees of which were varied, but were for the most part not severe. Reduction of both bone and air conduction was found in most cases. It was noted that men with damaged ears suffered less, proportionately, than those with sound ears.

In cases of excessive stimulation of the eighth nerve some cases seem to recover while a great many cases have only the subjective symptoms of tinnitus persisting. Protective appliances interfering with hearing are usually disliked by the men. The author found plugs of wool moistened with paraffin or glycerin useful under certain circumstances. A fairly common phenomenon, hyperaesthesia acustica, was noted when after a period of time the various sounds and noises became painful. It bore no apparent relationship to the production of deafness and, being a very definite thing, had to be differentiated from the psychological nervousness. Men on leave found certain sounds and noises extremely painful. (L. H. C.)

JACKSON, C. **The symptomatology and diagnosis of foreign bodies in the air and food passages. Based upon a study of 789 cases.** Am Jour. Med. Sc., May, 1921.

The author, after an exhaustive discussion of the subject, gives the following summary of the chief points in the symptomatology and diagnosis of a foreign body in the air and food passages.

LARYNX.

1. Foreign bodies lodged in the larynx cause an initial laryngeal spasm which is followed by more or less laryngeal wheezing, croupy cough, and a variable degree of impairment of phonation.

2. Pain in the laryngeal region may be present and is sometimes referred to the ears.

3. The larynx may tolerate a thin, flat foreign body for a relatively long period of time, but the development of increasing dyspnea renders early removal imperative in the majority of cases.

TRACHEA.

4. Tracheal foreign bodies are usually movable and their movements can usually be felt by the patient.

5. The vibrations may be palpated and heard with the stethoscope.

6. Cough is usually present at once, may disappear for a time and recur, or may be continuous and may be so violent as to induce vomiting.

7. Sudden shutting off of the expiratory blast and phonation during paroxysmal cough is almost pathognomonic of a movable tracheal foreign body.

8. Dyspnea is usually present and is due to the bulk of the foreign body plus the subglottic swelling caused by the traumatism of the shiftings of the intruder.

9. The asthmatoid wheeze is usually present and is often louder and of lower pitch than the asthmatoid wheeze of bronchial foreign bodies. It is heard at the mouth, not at the chest wall.

10. Pain is not a common symptom, but may occur and be accurately localized by the patient.

EARLY SYMPTOMS OF IRRITATING FOREIGN BODY (SUCH AS A PEANUT KERNEL) IN THE BRONCHUS.

BRONCHI.

11. Initial laryngeal spasm is almost invariably present with foreign bodies of organic nature, such as nut kernels, peas, beans, maize, etc.

12. A diffuse purulent laryngo-tracheo-bronchitis develops within 24 hours in children under 2 years.

13. Fever, toxemia, cyanosis, dyspnea, and paroxysmal cough are promptly shown.

14. The child is unable to cough up the thick mucilaginous pus through the swollen larynx and may "drown in its own secretions" unless the offender be removed.

15. Lung abscess rapidly forms.

16. The older the child the less severe the reaction.

17. In the early stages an acute obstructive emphysema is present, manifested by: (*a*) Limited expansion, (*b*) muffled tympanitic percussion note, (*c*) marked diminished or absent breath sound on the obstructed side, (*d*) many râles and harsh breathing on the free side.

18. The radiograph confirms these signs by showing (*a*) greater transparency on the obstructed side, (*b*) displacement of the heart toward the free side, (*c*) depression and limitation of the diaphragmatic movement on the obstructed side.

SYMPTOMS OF PROLONGED FOREIGN BODY SOJOURN.

BRONCHI.

19. The time of inhalation of a foreign body may be unknown or forgotten.

20. Cough and purulent expectoration ultimately result, although there may be a protracted delusive symptomless interval.

21. Periodic attacks of fever, with chills and sweats, and followed by increased coughing and the expulsion of a large amount of purulent, usually more or less foul, material are so nearly diagnostic of foreign body as to call for exclusion of this probability with the utmost care.

22. Emaciation, clubbing of the fingers and toes, night sweats, hemoptysis, in fact all of the symptoms of tuberculosis are in most cases simulated with exactitude, even to the gain in weight by an outdoor regimen.

23. Tubercle bacilli have never been found in the bronchoscopic clinic associated with foreign body in the bronchus. It was the only element lacking in a complete clinical picture of advanced tuberculosis. A point of difference was the rapid recovery after removal of the foreign body.

24. The erroneous statement in all of the textbooks that foreign body is followed by phthisis pulmonalis is an heirloom of the days when the bacillary origin of true tuberculosis was unknown, hence the foreign body phthisis pulmonalis or pseudotuberculosis was confused with the true pulmonary tuberculosis of bacillary origin.

25. The subjective sensation of pain may allow the patient to localize a foreign body accurately.

26. Foreign bodies of metallic or organic nature may cause their peculiar taste in the sputum.

27. Offensive odored sputum should always suggest bronchial foreign body; but absence of sputum, odorous or not, should not exclude foreign body.

28. Sudden complete obstruction of one main bronchus does not cause noticeable dyspnea provided its fellow is functionating.

29. Complete obstruction of a bronchus is followed by rapid onset of symptoms.

30. The pleura is rarely involved. Rib resection done for supposed empyema have with one exception shown no pus.

31. The physical signs usually show limitation of expansion on the affected side, impairment of percussion, and lessened transmission or absence of breath sounds distal to the foreign body.

32. The "asthmatoid wheeze" may, if present, be of great diagnostic value. Its absence, however, does not negative the presence of foreign body.

33. All cases of chest disease should have the benefit of a radiographic study to exclude bronchial foreign body as an etiological factor, and negative opinions should never be based upon any plates except those of the utmost perfection that the wonderful modern development of the art and science of roentgenology can produce. In doubtful cases, the negative opinion should not be conclusive until a roentgenologist of long and special experience in chest work has been called in consultation. Even then there will be an occasional case calling for diagnostic bronchoscopy.

34. Symptoms of pulmonary abscess, or other lung disease, even cough, following within a few weeks of the extraction of teeth, call for the exclusion of foreign body in the lung.

ESOPHAGUS.

35. There are no absolutely diagnostic symptoms of esophageal foreign body.

36. Dysphagia, however, is the most constant complaint, varying in degree with the size of the foreign body and the degree of inflammatory or spasmodic reaction produced.

37. Pain may be caused by the penetration of a sharp foreign body, by inflammation secondary thereto, by impaction of a large object, or by spasmodic closure of the hiatal sphincter.

38. The subjective sensation of foreign body is usually present, but can not be relied upon as assuring the presence of a foreign body, for it is present for a time after the passage of the intruder.

39. All of these symptoms may exist, often in most intense degree, from previous violent attempts at removal, and the foreign body may or may not be present.

40. Fluroscopic study of the swallowing function with barium mixture or capsule will give the location of a foreign body which may not be radiopaque.

41. Anteroposterior and lateral roentgenograms should always be made.

42. The value of a radiograph after the removal of the foreign body can not be too strongly emphasized.

STOMACH.

Foreign body in the stomach ordinarily produces no symptoms. The roentgenogram and the fluoroscopic study with an opaque mixture are the chief means of diagnosis. (W. M. K.)

WÜRDEMANN, H. V. **Etiology and prevention of injuries to the eye.** Mil. Surgeon, August, 1921.

The author, in a general discussion of the etiology of eye injuries, gives the following outline of the objective examination of an eye.

"Inspection by direct illumination by daylight, electric light, or reflecting mirror is first made. The skin, lids, cornea, conjunctiva, puncta, lacrimalia, etc., are observed. Then the retrobulbar folds and undersurface of the lids are brought into view by eversion with the fingers, but preferably by pushing down the retrotarsal folds by a smooth instrument, as a small glass rod, handle of an instrument, or cotton-tipped stick, as it is here that most diseases of the conjunctiva are prominent and foreign bodies may be impacted therein.

"Many small and otherwise almost indistinguishable abrasions of the corneal epithelium, wounds, and small foreign bodies in the cornea may be brought into view by the staining of the tissues with a 2 per cent fluorescein and 2 per cent bicarbonate of soda solution. This aniline dye will not stain the intact corneal epithelium, but readily passes into the subjacent parenchyma and abraded epithelial cells, forming a bright-green background upon which foreign bodies are readily perceived.

"Magnification of the eye by a lens, preferably by the Berger or Jackson binocular loupe, is of great value.

"Focal illumination in the dark room is ordinarily carried out by focusing the light upon the eye by a large loupe. The use of the diaphanoscope for this purpose gives, however, a much better illumination, as the light is confined to a narrow beam.

"The ophthalmoscope should first be used at a distance of a couple of feet from the eye and magnification obtained by use of a + 3 to +16 lens in the instrument, the patient being directed to look in various directions, whereby a foreign body may be brought into view against the red background of the fundus; approaching closer to the eyes, after the cornea and anterior chamber have been examined in this manner, the lens, vitreous, and fundus are then successively investigated. The electric ophthalmoscope, with light regulated by a rheostat, gives the most elastic means of such examination. Diaphanoscopy is a means of rendering the eyeball luminous, whereby the shadow of the ciliary body, iris, tumor, or large foreign body within the eye may be observed. I have a number of times determined the presence of foreign bodies which were at first indiscernible by other methods behind the iris, in the lens, or in the fundus, by this method.

"The sideroscope, if properly made and mounted, will determine the presence of a foreign body, but it must be magnetic, and the accuracy with which you are able to locate foreign bodies within the eye often varies from 1 to 3 cm. 'The instrument is a marvel of delicacy, but to handle it requires the patience of a saint.'

"The giant magnet will reveal the presence of magnetizable pieces of steel and iron by causing traction within the eye, varying from a drawing sensation to decided pain on approach of the eye to the magnet. The foreign body may likewise be drawn into view, or the eye may adhere or curve forward toward the magnet if the body be sufficiently large. Such a method of examination is, however, somewhat dangerous on account of the foreign body, while approaching the magnet, acting as a missile and tearing structures that might not have been previously injured. In such examination the eye, needless to say, should not be anesthetized.

"The increasing use of magnesium and nickel steel renders the number of nonmagnetizable foreign bodies somewhat larger in proportion than previously.

"The exact determination of the existence, position, and size of foreign bodies within the globe has only become possible since the advent of the roentgen rays.

"As the frequency of injuries to the eye from flying copper increases in number each year, due to more extended use of that metal, largely from the increased use of electricity, the value of *accurate radiographs* becomes more apparent.

"In a series of experiments to determine the degree of penetration of the X rays to various substances, such as glass, marble, granite, cement, etc., the size of each was approximately 2 x 2½ mm.; the result shows that all of these substances can be made visible if proper technique be followed. The figures show the density of shadows of each material, the exposure being the same for all materials, coal being the only one used that failed to demonstrate a shadow of any usefulness." (W. M. K.)

Mosher, H. P. **The Mosher-Toti operation on the lachrymal sac.** Laryngoscope, May, 1921.

The author in a brief summary gives the steps of the combined external and internal operation on the lachrymal sac and nasal duct, as modified by him from the operation devised by Toti.

The results thus far obtained have been most satisfactory. In a series of 21 cases operated or supervised by the author 1 case was done one year ago and has been perfectly well since. The remaining 20 were operated during the past six months and, in the majority, the results so far have been good in that the infection has been cleared up and the patient has been relieved of the epiphora.

The operation is comparatively simple to perform and has the great advantage of being done entirely by sight. No case of orbital infection has occurred to date. Time necessarily will determine the permanency of the excellent results thus far obtained. (L. H. C.)

LEEGAARD, F. **Tuberculosis of the middle ear.** Laryngoscope, June, 1921.

The author's observations were made in the University Hospital in Christiania, Norway, among patients suffering from purulent otitis media to determine the relative frequency of tuberculosis of the middle ear. In his studies 200 cases of purulent otitis media are included, and all cases but one had a mastoid operation performed. The laboratory studies included histological examination of tissue removed at the time of operation and guinea-pig inoculation using material untreated with antiformin, which was injected subcutaneously. These two methods are considered the most trustworthy.

Among the 200 cases of acute, subacute, and chronic purulent otitis media 20 cases of tuberculosis of the middle ear were found. Of these, 13 occurred among 95 males and 7 among 105 females. Among 115 acute and 78 chronic cases of middle-ear disease 10 and 5 cases, respectively, were found tuberculous, while in the 7 subacute cases 5 were tuberculous. Regarding age, the incidence was found greatest between the ages of 3 and 7 years—9 cases in 30 examined. He is unable to explain this high rate, but points out that tuberculosis in children is common as evidenced by the high percentage of positive tuberculin tests obtained among school children.

In the clinical diagnosis no constant characteristic findings were noted. More than one perforation of the drum membrane is considered significant of tuberculous otitis media, but he found this in only one case, and this a phthisical subject. Tubercules on the drum membrane, although typical, are rare. In acute and subacute cases the presence of abundant, rapidly growing, and recurring granulations is of importance. Facial paralysis is considered of frequent occurrence, but the author found none in the cases of tuberculosis, while he found 4 cases among the 180 nontuberculous patients; however, facial palsy and multiple perforations of the drum are commonly seen in advanced pulmonary or other form of tuberculosis complicated by middle-ear disease.

Regarding the findings at operation—the appearance of the granulations is not considered characteristic but the presence of yellow-white or gray-white, puttylike material is positive evidence of the presence of tuberculosis. No cholesteatoma was found and the amount of pus in the mastoid was usually small.

Pain is a fairly constant symptom and about half of the cases started as acute otitis media, so the clinical picture affords little toward making a diagnosis of tuberculosis. The postoperative course is more typical, for in cases where either the simple or radical operation had been done the wound did not heal rapidly, a long, narrow, encrusted sinus often persisting; and while some cases healed in from 6 to 12 months, others did not heal at all. This is seen especially in children.

The Von Pirquet test was done in 191 cases and gave 67 negatives and 124 positives. A negative reaction is of value at all ages while a positive is of value clinically only in cases of otitis media occurring in children under 7 years of age. Regarding treatment, operation should be resorted to unless there is some distinct contraindication. The author used tuberculin in those cases where improvement, postoperative, was not satisfactory. Application was made directly into the diseased middle ear to avoid some of the untoward effects, e. g. facial paralysis and labyrinthine disturbances, recorded in the literature. From the 20 cases a like number of strains of tubercle bacilli were cultivated, and further inoculation tests showed them all to be of the human type.

No definite conclusions were drawn from these cases; however, the comparative frequency of tuberculous otitis media, especially between the third and seventh years of age, the lack of characteristic clinical signs and symptoms, also operative findings, and the question of tuberculin treatment require the studying of a greater amount of material and the careful examination of all cases of otitis media, especially when occurring in children. (L. H. C.)

NOTES AND COMMENTS.

From the British Journal of Surgery for July, 1921, we learn that Sir D'Arcy Power, K. B. E., of London, proposes to give in a series of articles to appear in that publication the ipsissima verba of those surgeons whose names are associated with the diseases or injuries to which they first called attention. Many of these descriptions, he tells us, are so short that they can be reproduced at length; others will be abbreviated but all are so clear that they have gained a world-wide acceptance. If one has access to a large medical library the original papers are not hard to find, but few medical officers have the leisure or the opportunity to discover them; therefore, Sir D'Arcy's series of short articles should prove, as he says, both instructive and interesting.

His first presentation is the original paper which gave the name to Colles's fracture. It appeared in the Edinburgh Medical and Surgical Journal, 1814, Volume X, page 182, and was entitled "On the fracture of the carpal extremity of the radius, by A. Colles, M. D., one of the professors of anatomy and surgery in the Royal College of Surgeons in Ireland." The following is a complete transcript of this historic paper:

"The injury to which I wish to direct the attention of surgeons, has not, as far as I know, been described by any author; indeed, the form of the carpal extremity of the radius would rather incline us to question its being liable to fracture. The absence of crepitus and of the other common symptoms of fracture, together with the swelling which instantly arises in this, as in other injuries of the wrist, render the difficulty of ascertaining the real nature of the case very considerable.

"This fracture takes place at about an inch and a half above the carpal extremity of the radius, and exhibits the following appearances:

"The posterior surface of the limb presents a considerable deformity, for a depression is seen in the forearm about an inch and a half above the end of this bone, while a considerable swelling occupies the wrist and metacarpus. Indeed, the carpus and base of metacarpus appear to be thrown backward so much as on first view to

excite a suspicion that the carpus has been dislocated forward. On viewing the anterior surface of the limb, we observe a considerable fulness, as if caused by the flexor tendons being thrown forward. This fulness extends upward to about one-third of the length of the forearm and terminates below at the upper edge of the annular ligament of the wrist. The extremity of the ulna is seen projecting toward the palm and inner edge of the limb; the degree, however, in which this projection takes place is different in different instances.

"If the surgeon proceed to investigate the nature of this injury, he will find that the end of the ulna admits of being readily moved backward and forward.

"On the posterior surface he will discover by the touch that the swelling on the wrist and metacarpus is not caused entirely by an effusion among the softer parts; he will perceive that the ends of the metacarpal and second row of carpal bones form no small part of it. This, strengthening the suspicion which the first view of the case had excited, leads him to examine in a more particular manner the anterior part of the joint, but the want of that solid resistance, which a dislocation of the carpus forward must occasion [*sic*], forces him to abandon this notion, and leaves him in a state of perplexing uncertainty as to the real nature of the injury. He will therefore endeavor to gain some information by examining the bones of the forearm. The facility with which (as was before noticed) the ulna can be moved backward and forward does not furnish him with any useful hint. When he moves his fingers along the anterior surface of the radius, he finds it more full and prominent than is natural; a similar examination of the posterior surface of this bone, induces him to think that a depression is felt about an inch and a half above its carpal extremity. He now expects to find satisfactory proofs of a fracture of the radius at this spot. For this purpose, he attempts to move the broken pieces of bone in opposite directions; but, although the patient is by this examination subjected to considerable pain, yet neither crepitus nor a yielding of the bone at the seat of fracture nor any other positive evidence of the existence of such an injury is thereby obtained. The patient complains of severe pain as often as an attempt is made to give the limb the motions of pronation and supination.

"If the surgeon lock his hand in that of the patient's, and make extension, even with a moderate force, he restores the limb to its natural form, but the distortion of the limb instantly returns on the extension being removed. Should the facility with which a moderate extension restores the limb to its form induce the practitioner to treat this as a case of sprain, he will find, after a lapse of time sufficient for the removal of similar swellings, the deformity undimin-

ished. Or, should he mistake the case for a dislocation of the wrist, and attempt to retain the parts in situ by tight bandages and splints, the pain caused by the pressure on the back of the wrist will force him to unbind them in a few hours; and if they be applied more loosely, he will find at the expiration of a few weeks that the deformity still exists in its fullest extent and that it is now no longer to be removed by making extension of the limb. By such mistakes the patient is doomed to endure for many months considerable lameness and stiffness of the limb, accompanied by severe pains on attempting to bend the hand and fingers. One consolation only remains, that the limb will at some remote period again enjoy perfect freedom in all its motions and be completely exempt from pain; the deformity, however, will remain undiminished through life.

"The unfavorable result of some of the first cases of this description which came under my care forced me to investigate with peculiar anxiety the nature of the injury. But while the absence of crepitus and of the other usual symptoms of fracture rendered the diagnosis extremely difficult, a recollection of the superior strength and thickness of this part of the radius, joined to the mobility of its articulation with the carpus and ulna, rather inclined me to question the possibility of a fracture taking place at this part of the bone. At last, after many unsuccessful trials, I hit upon the following simple method of examination by which I was enabled to ascertain that the symptoms above enumerated actually arose from a fracture seated about an inch and a half above the carpal extremity of the radius.

"Let the surgeon apply the fingers of one hand to the seat of the suspected fracture and, locking the other hand in that of the patient, make a moderate extension, until he observes the limb restored to its natural form. As soon as this is effected let him move the patient's hand backward and forward, and he will, at every such attempt, be sensible of a yielding of the fractured ends of the bone and this to such a degree as must remove all doubt from his mind.

"The nature of this injury once ascertained, it will be a very easy matter to explain the different phenomena attendant on it, and to point out a method of treatment which will prove completely successful. The hard swelling which appears on the back of the hand, is caused by the carpal surface of the radius being directed slightly backward instead of looking directly downwards. The carpus and metacarpus, retaining their connections with this bone, must follow it in its derangements and cause the convexity above alluded to. This change of direction in the articulating surface of the radius is caused by the tendons of the extensor muscles of the thumb, which pass along the posterior surface of the radius in sheaths firmly connected with the inferior extremity of this bone. The broken ex-

tremity of the radius being thus drawn backward, causes the ulna to appear prominent toward the palmar surface, while it is possibly thrown more toward the inner or ulnar side of the limb, by the upper end of the fragment of the radius pressing against it in that direction. The separation of these two bones from each other is facilitated by a previous rupture of their capsular ligament, an event which may readily be occasioned by the violence of the injury. An effusion into the sheaths of the flexor tendons will account for that swelling which occupies the limb anteriorly.

"It is obvious that, in the treatment of this fracture, our attention should be principally directed to guard against the carpal end of the radius being drawn backward. For this purpose, while assistants hold the limb in a middle state between pronation and supination, let a thick and firm compress be applied transversely on the anterior surface of the limb at the seat of fracture, taking care that it shall not press on the ulna; let this be bound on firmly with a roller and then let a tin splint, formed to the shape of the arm, be applied to both its anterior and posterior surfaces. In cases where the end of the ulna has appeared much displaced I have laid a very narrow wooden splint along the naked side of this bone. This latter splint I now think should be used in every instance, as, by pressing the extremity of the ulna against the side of the radius, it will tend to oppose the displacement of the fractured end of this bone. It is scarcely necessary to observe that the two principal splints should be much more narrow at the wrist than those in general use and should also extend to the roots of the fingers, spreading out so as to give a firm support to the hand. The cases treated on this plan have all recovered without the smallest defect or deformity of the limb in the ordinary time for the cure of fractures.

"I can not conclude these observations without remarking that were my opinion to be drawn from these cases only which have occurred to me I should consider this as by far the most common injury to which the wrist or carpal extremities of the radius and ulna are exposed. During the last three years I have not met with a single instance of Dessault's dislocation of the inferior end of the radius, while I have had opportunities of seeing a vast number of the fracture of the lower end of this bone.

"Stephens Green, *February 21, 1814.*"

The Presse Médicale, Paris, for June 29, 1921, contains an appreciative editorial report by Prof. E. Benoit, of Montreal, on the Fifth Congress of American Medicine, held in Baltimore, February 21 to 26, 1921. It is always interesting, when possible, to see ourselves as others see us. Prof. Benoit, after adverting to the fact

that American medicine is now advancing by rapid strides and gives promise of reaching the high plane already attained by American surgery, compares the methods in vogue at an American congress of medicine with the conduct of a similar meeting abroad. He holds that most of the papers read and discussions carried on at medical meetings in Europe would be fully as useful if they simply appeared from the first in current medical periodicals, and thinks that the distinctly clinical character of American meetings has far greater practical value. He notes as peculiar to America the disposition to exploit the clinical facilities and clinical methods in vogue in the city where the congress meets.

Dr. Benoit was especially impressed with the large number of visitors who could be accommodated at medical clinics on the occasion of a congress; the fact that such a congress is more than a holiday or an opportunity for formal meetings and calls. Of special importance for those attending a medical congress is the opportunity to compare the different methods that obtain in the various hospitals, dispensaries, and clinics of a large medical center.

Our system of medical instruction, our haphazard granting of diplomas, and many other features of American professional training and life have so long been the object of frank, not to say harsh, criticism at the hands of our foreign colleagues, that it is most gratifying to read discriminating but favorable comment on some features of American medical work.

A valuable publication for medical officers on distant stations is the series of "Case Records" (ante mortem and post mortem) as used in weekly clinico-pathological exercises at the Massachusetts General Hospital, edited for the use of practitioners by Richard C. Cabot, M. D., and Hugh Cabot, M. D. Published weekly by the Massachusetts General Hospital, Boston, Mass., the "Case Records" reproduce in print the class exercises held at the hospital. The clinical history of each case is printed on one sheet to be studied first. On another is printed the class discussion. The clinical diagnosis in the wards and in the class are then given, and finally the pathological findings. The subscription price of the series is $8 yearly.

The American Society for the Control of Cancer, whose headquarters are at 25 West Forty-fifth Street, New York City, has announced plans for a national cancer week to be conducted from October 30 to November 5. The society aims to give the widest publicity throughout the country to the question of cancer during that week;

and in order to aid physicians who might desire to give lectures on this subject the society has prepared a lecture syllabus which may be had on application to the society's headquarters in New York. The lecture outline comprises a fairly comprehensive discussion of the whole subject of cancer.

An announcement has been made of the authorization by the board of trustees of the United States Pharmacopœial Convention of the use of the text of the ninth revision of the United States Pharmacopœia for translation into the Chinese language. It is understood that this will be accepted by the Government officials in China and become the Pharmacopœia of China, first edition.

George Vitoux, writing in the Presse Médicale for June 25, 1921, reports a discussion on the municipal disposal of garbage before the Society of Public Medicine. M. Mazerolle summarizes as follows the principal problems connected with the municipal disposal of garbage: (1) Destruction of domestic garbage within domiciliary limits; (2) systematic sorting of garbage; (3) appropriate covered receptacles; (4) the type of wagons for removal; (5) schedule for collection; (6) the financial aspects of garbage disposal.

Immediate local destruction of garbage within domiciliary limits would be the ideal method of disposal if a practical working system could be devised. This has not been done.

At Charlottenburg, near Berlin, the systematic sorting of garbage is carried out. Three different recipients are used: One for kitchen refuse, a second for nonfermentable material, such as rags, paper, broken crockery, and the like; and a third for ashes, cinders, etc.

The greatest difficulty in the handling of garbage is to devise a container with a lid that can be safely fastened without too much difficulty. M. Mazerolle showed a model of the garbage container which he recommended, but unfortunately the article from which we quote is not illustrated.

In wholesale disposal of garbage by horse-drawn vehicles or automobile vans, two features are essential: (1) Such vehicles must be so covered that their contents will not be visible or liable to be blown away by the wind; (2) the loading and unloading must be easy of accomplishment.

The nocturnal collection of garbage is the ideal one, because the streets are then less congested and stores, etc., are closed. These two features lessen the danger of dissemination of garbage.

The task of removing and disposing of garbage should be financed in the same way that municipalities finance the supply of potable

water, of gas, of electricity, etc. In other words, garbage disposal should be viewed in the light of a public utility. The duty of disposing of garbage is absolutely analogous to the duty of providing a sewerage system.

The first number of The American Journal of Tropical Medicine appeared in January of this year. This journal is the official organ of the American Society of Tropical Medicine and will be published bimonthly by Williams & Wilkins Co., of Baltimore. Its editor in chief is Lieutenant Colonel H. J. Nichols, Medical Corps, U. S. Army, and the advisory editorial board is a most excellent one. Its articles should be of particular interest to naval medical officers.

On small vessels serving along the coasts of Central America it is not uncommon for parties of men to camp on the beach over a week end for the purpose of hunting, fishing, or other recreation. Delectable as this practice is, it is not unattended by danger.

Recently five young employees of the Balboa shops went on an excursion into the unsanitated area of the interior of the Canal Zone and spent a night in a vacant shack. Following their return four of them were admitted to Ancon Hospital, where they were found to be suffering from relapsing fever. A few days later four young boys of Pedro Miguel also slept in the same shack. Two of them were subsequently sent to Ancon Hospital with relapsing fever and one of these had malaria also.

The entomologist of the board of health laboratory was sent to the locality to make an investigation. He found in the shack where these boys had slept a rude bed made of dried bamboo. The bed was fairly alive with ticks—hundreds of them. Quite a number were collected and brought back to the laboratory for identification and experimental work to determine if they are of the type that really convey the disease. The laboratory work has not yet been completed, but the evidence above presented is sufficient to demonstrate that such trips to the uncontrolled or unsanitated areas of the Isthmus are fraught with dangers, and that even those who take precautions against mosquito bites may be exposed to attack by other insects equally dangerous.

We learn from the British Medical Journal for May 14, 1921, that "at a meeting of the war section of the Royal Society of Medicine, Surgeon Commander S. F. Dudley, R. N., related a few observations on the influenza epidemic as it affected the Royal Navy. He referred

principally to the epidemic of 1918, though he also touched on the epidemic as seen at Portsmouth at the beginning of 1921. He began with some remarks on bacteriology. He said that he had been able to demonstrate *B. influenzae* in association with the cases, save in the spring cases of 1918, when he used an unsatisfactory technique. He thought that this organism was the most likely cause of the epidemic, but it was curious that within the last two years he had swabbed batches of men—260 in all—who exhibited no signs of influenza, but were mostly venereal convalescents at Haslar, and in half of them he found this organism in the nose and throat. The probability was that the organism which went by this name was really a group of organisms, and the variation in the morphology of the different strains supported this view. The reason for these numerous influenza carriers might be that only certain strains of *B. influenzae* were capable of producing influenza symptoms. He thought it possible that if the whole population of the country had been continuously examined during the last two years it would be found that almost all persons at some time or other for a longer or shorter period harbored influenzalike organisms. Virulent carriers, however, did exist, as well as harmless carriers, and it seemed reasonable to suppose that it was the infective individual who adapted himself to the parasite rather than the parasite which adapted itself to its host. His theory to explain the number of harmless carriers was that the virulent strains which started an epidemic became eliminated, and the organism succeeded in adapting itself to its environment and became the highly infective but innocuous strain found in these so-called carriers. The great variation in influenza attack was due (1) to variation in the primary organism, (2) to variations in individual susceptibility, (3) to different combinations of bacterial flora causing the illness. Whatever the primary parasite might be, it depressed the resistance to bacterial invasion, so that any pathogenic organism in the neighborhood seemed to attain greater virulence, the result being a complex disease in which the secondary invader might play the more important part. The fact that the pulmonary complications of influenza were generally present from the onset suggested that the so-called secondary infection was not secondary in time, but was contracted simultaneously with the primary infection. Possibly influenza was always a double infection with *B. influenzae* plus another organism, whose assistance made the influenza bacillus a more dangerous parasite.

"Surgeon Commander Dudley then related the history of a few ships of the Royal Navy during the epidemic of 1918. As an instance of high infectivity and high virulence he gave the case of H. M. S. *Africa*, where, among a ship's company of nearly 800, the attack rate was 75 per cent and the case mortality 9 per cent, and H. M.

S. *Britania*, where the attack rate was 58 per cent and the case mortality 7.5 per cent. On H. M. S. *Revenge*, with a company of 1,200, the attack rate in the first wave (spring, 1918) was 17 per cent and in the second wave (autumn, 1918) it was 20 per cent. He believed that the attack rate to be expected in a thoroughly infected ship was 25 per cent in the first wave and 25 per cent in the return wave. A ship's company—and possibly this was true of the population as a whole—consisted roughly of a quarter who were highly susceptible, succumbing at once; a quarter who were less susceptible, succumbing on the return wave, while the other half had natural immunity. In the early part of 1921, at Portsmouth, one ship reported 82 cases, or 7 per cent of her company, and another 61 cases, or 6 per cent. Many of these cases were little more than feverish colds. It might be that the strain of influenza of 1921 was totally different from that of 1918, but he inclined to the view that by 1921 about 5 per cent of the population had become highly susceptible, 5 per cent ordinarily susceptible, and 90 per cent fairly immune to the influenza virus, as against 50 per cent susceptible and 50 per cent immune in the 1918 epidemic. He believed that disinfection sprays and gargles and isolation were of little effect in the crowded condition of a battleship, where 1,000 men might be living within an area, including all decks, of a quarter of a square mile, but that disease could be kept from spreading from ship to ship and from shore to ship if the quarantine was made absolute. Prophylactic vaccination probably diminished the incidence to one-third and the case mortality to nearly one-twentieth."

Benvenuto Cellini (1500–1571), a highly artistic Italian goldsmith and metal worker, wrote an autobiography which has long had a fascination for those who delight to delve into the past. There are many translations of Benvenuto's book, the best being that of John Addington Symonds, published by Brentano and by Scribners. Royal Cortissoz, in a delightful essay on this remarkable man, tells us that the pages of Cellini's autobiography are invaluable for the pictures they contain of Italian society in the author's day. "He touched life at many points, mingling not only with artists but with princes and prelates. He had a 'devouring eye' and a good memory. A thing once seen stuck in his mind; a thing once heard by him was well remembered and when he dictated his memoirs he gave them the vitality of a daily journal. Moreover, he was of the race of Bocaccio, which is to say, that he was a born story-teller, a man who naturally dramatized his experiences as he came to relate them, making the most of a personality or a situation, and above all flinging over everything an air of reality, of movement.

"Cellini was a master of picaresque literature. He loved adventure and nothing in the world gave him quite the joy that he got from a hand-to-hand fight. He was happy when he was at work; happy when he was foregathering with Giulio Romano or some other boon companion in Florentine Bohemia when the day's task was done; happy when he was arguing with a patron; happy when he was driving his dagger up to the hilt in the neck of his enemy; happy in short, whenever circumstances convinced him that he was alive and playing the part of a man.

"Cellini may have been too late to witness the richest developments of the Renaissance, but there were still great spirits on earth sojourning when he was born, and even those public figures that were not precisely great had characteristics or filled positions significant to the modern reader. Cellini filled his canvas with a generous hand. He was himself his best theme, but he drew a friend or an enemy with the same care that he bestowed upon his own traits or mischances, and though he had a due sense of the powers of the great ones with whom he came in contact, it was with a quite unhampered brush that he introduced pope or mundane potentate upon the scene. He spoke of artists and their work with the intimate accent of Vasari and with a robuster, warmer, more roughly human element of appreciation in his voice. He was every inch a man, and it was a man's report of what he did and felt and saw that he gave us."

Cellini lived in Italy during a period when medical practice was still hand in hand with quackery and superstition. His impressions and experiences of medicine and doctors have been set forth recently by Dr. Jacob Rosenbloom in an essay published in the fourth number of the second volume of Paul B. Hoeber's Annals of Medical History. Dr. Rosenbloom believed Cellini to have been a paranoiac, and all medical men who have read Cellini's book may readily agree with him. He had plague at an early age and malaria several times. He described an illness lasting two months which he ascribed to the bad air of Pisa. This may have been typhoid. He cited a case of what might have been osteomyelitis, in the treatment of which Maestro Giacomo Rostelli, a surgeon of note, "was using some coarse steel instrument" which was inflicting severe pain on the patient. Cellini begged the surgeon to stop, and running to his shop he made "a little scalping iron of steel, extremely thin and curved: it cut like a razor." The surgeon used it with so gentle a hand that the patient felt no pain. Cellini was the victim of gout in his later years, and had two surgical accidents, a fracture of the leg and a splinter of steel in the eye, besides numerous wounds acquired in brawls.

As he lived in lawless and profligate times he contracted syphilis, or the French disease, as it was then called in Italy, which remained dormant for four months and then "broke out over his whole body."

After quarreling with his doctors over the diagnosis and treatment of his disease, he began to take guaiacum, recently introduced from America, "against the advice of the first physicians in Rome," and after 50 days he was cured and "as sound as a fish in the water."

He had several recurrent manifestations of the disease. A slow fever which he attributed to the exposure of hunting on the campagna might have been of syphilitic origin. Once he had a painful inflammation of the eyes cured by a simple eye wash recommended by the Pope. Dr. Rosenbloom believes this affliction to have been of an hysterical nature, but it might have been an iritis due to syphilis.

Cellini mentions as one of his acquaintances, Giacomo da Carpi, a great physician, surgeon, and student of anatomy, who is said to have been the first to use mercury in the cure of syphilis. He amassed a large fortune through the results of the practice of mercurial fumigation and inunction.

Cellini tells us that at least three attempts were made to poison him; in one a crushed diamond was to be mixed with his food, with the object of producing an enteritis, but the poor workman entrusted with the breaking of the precious stone substituted a soft stone, so enriching himself, and, as Benvenuto Cellini believed, saving him from a painful death. Once some enemy put some mercury or arsenic into a sauce of which Cellini ate "two moderate mouthfuls." This produced a colitis from which he suffered greatly, but, as he tells us, "the poison worked so well that whereas, before I took it I had but perhaps three or four years to live, I verily now believe that it has helped me more than 20 years by bettering my constitution," for which we are thankful, for had the poison acted as designed we would have been deprived of his delightful autobiography.

Christophers, of London, has published A Consulting Surgeon in the Near East, by A. H. Tubley, F. R. C. S. (England), a consulting surgeon to the Mediterranean and Egyptian Expeditionary Forces in 1915–1919. The book gives a vivid picture of the conditions encountered by the British medical officers in the campaign in the eastern Mediterranean. The author tells of his experiences supervising the operative work when the sand-laden south wind was blowing and the temperature was 109° F., and when the wards were infested with flies which spread infection from the dysentery cases. He tells of transports for the sick, which seemed to lack everything necessary for the care of the sick, and he tells of the lice. The crisis of the Dardanelles campaign at Suvla is given graphically—the final defeat of the British forces, the overladen hospital ships, the insufficiency of fresh water, the absolutely necessary operations.

There are chapters dealing with his administrative experiences, surgical matters, the dental work, and the sick and convalescent soldier. The medical officer should find this a very readable book.

A special bulletin issued by the New York Department of Labor, on Asphyxiation in Garages, says that the formation of carbon monoxide gas is due to a lack of a proper amount of oxygen in the combustion process. One hundred and thirteen cases of asphyxiation occurred within two years in New York State. This emphasizes the necessity of proper and sufficient ventilation at all times about gasoline-driven motors.

After the armistice the nucleus of a permanent dental service in the British Navy was formed and new regulations governing entry into the Royal Naval Dental Service have recently been issued. Before a successful candidate is given a commission as surgeon lieutenant (D) in the British Navy he will be required to pass through a course of special training of a month's duration and his commission will be confirmed on passing the qualifying examinations at the end of this course. The subjects for the entrance examination will embrace dental surgery, including dental pathology and therapeutics, oral hygiene, and oral prosthetics. Candidates must obtain at least 50 per cent in each subject. A postgraduate course of three months' duration will be allowed to surgeon lieutenant commanders (D) of over two years' seniority. This postgraduate course is designed to afford senior officers the opportunity of refreshing their general knowledge of dental surgery and making themselves familiar with modern advances. The dental officer on a ship will be responsible directly to the captain. Surgeon lieutenants (D) will receive as pay from £401 to £492; surgeon lieutenant commanders (D), £493 to £730; and a surgeon commander (D), £775 to £912. There are to be 48 officers of the Royal Naval Dental Service, but of these only one can hold the rank of surgeon commander (D).

On February 24, 1921, there passed away at Boggs, Pencaitland, East Lothian, England, at the age of 56, Surgeon Captain Lomas, R. N., an officer of note in the British service. Before the war he was operating surgeon at Haslar Hospital. In 1914 he had the unique experience of commanding two hospital ships, the *Maine* and the *Rohilla*, both of which were wrecked while transporting wounded. On these occasions his calm courage and unflinching example in the

face of appalling calamity and bitter exposure did much to maintain order, and to cheer and sustain the morale of patients who were apparently doomed. Captain Lomas was well known to several of our senior medical officers, who will learn of his death with the deepest regret. He was an honorary member of the Association of Military Surgeons of the United States.

Humphrey Mitford, of New York and London, has recently published the second edition of Counsels and Ideals from the Writings of William Osler, selected and edited by Dr. C. N. B. Camac, of New York. In 1905 Dr. Camac, who was a pupil of Osler, prepared, with the consent and guidance of his beloved teacher, a volume of Counsels and Ideals, selected from 47 of Sir William Osler's writings. The collection represented Dr. Osler's philosophy of life down to the time he was appointed regius professor of medicine at Oxford. The second edition contains extracts from 26 addresses and papers published since 1904, which form an appropriate summary of Dr. Osler's general teaching in England. This little volume should be in every physician's library.

One hundred years have passed since John Keats, the English poet, died in Rome. The first of his printed poems, "The Imitation of Spenser," was written in 1812, when he was but 17 years of age. The last appeared in 1820, when the poet lay dying from tuberculosis. Many of us have found pleasure in the beauty of his lines and in his philosophy, but few know that in his early youth Keats attempted the study of medicine. After his mother's death from tuberculosis Keats, then 15 years old, was apprenticed for five years to a surgeon named Hammond, at Edmonton, England; but in 1814, a year before his apprenticeship was completed, he entered at Guy's Hospital, and in 1816 passed the examination for the license of the Apothecaries' Society with credit. He never attempted any further medical work, and his writings do not reveal any obvious impression from his professional studies, yet it is difficult to conceive that his responsive mind was unaffected by them.

Mr. Paul B. Hoeber, of New York, has published the Life and Times of Ambroise Paré, by Dr. Francis R. Packard, of Philadelphia.

Ambroise Paré, the surgeon to Charles IX, began his surgical career as a rustic barber's apprentice. Later he became a dresser at the Hotel Dieu in Paris, from which, after eight years' practical

work, he entered the army and soon made himself the greatest surgeon of his time by his courage, ability, and common sense. Paré invented many new surgical instruments, made amputation what it is to-day by reintroducing the ligature, which had almost fallen into abeyance since the time of Celsus; was the first to popularize the use of the truss in hernia; introduced massage, artificial eyes of gold and silver, and made the first exarticulation of the elbow joint. The story of Paré's activities gives an interesting and vivid picture of Renaissance France. As a military surgeon Paré operated upon battlefields which coincide closely to those of the late war. Any medical officer who is interested in the history of medicine or in French history will find much of interest in this book.

The British Medical Journal for April 30, 1921, informs us that the fetor in ozena is due to the decomposition of protein bodies by means of bacterial tryptic ferments with formation of mercaptan and other sulphur compounds, and that the Perez bacillus, which is supposed to be the cause of ozena, plays the principal part in this decomposition. In the nasal cavities there is normally a rich bacterial flora, consisting, among other germs, of glycolytic bacteria, so called owing to their power to ferment sugar. The object of the recently introduced glucose treatment of ozena is to increase the activity of these microorganisms in the fermentation of carbohydrates, to the detriment of the Perez bacillus. Moreover, tryptic ferments require an alkaline medium to act on protein substances, whereas the fermentation of sugars is accompanied by the formation of acid, whereby the proteolytic activity of the Perez bacillus is inhibited and the organism itself destroyed. The treatment consists in first removing the crusts by irrigation with an alkaline solution or spray and then applying a solution of glucose or honey on swabs three or four times a day to all parts of the nasal cavity. In 22 cases so treated by Bruzzi in Italy very satisfactory results were obtained. In 10 patients glucose was used and in 12 honey, the results being equally good in both cases. The duration of the treatment ranged from 15 to 30 days.

As ozena is a condition which on board ship makes the patient especially obnoxious to his shipmates this simple treatment may be well worth a trial.

That workers engaged in certain branches of the pottery trade are seriously and constantly exposed to lead poisoning, chiefly from the lead contained in the glaze, and that this danger can be reduced, provided that certain facilities and methods are altered by the pottery

owners and certain precautions taken by the workers, sums up the findings of a report to the United States Public Health Service, made by Consulting Hygienist Bernard J. Newman, Dr. William J. McConnell, Dr. O. M. Spencer, and Statistician F. M. Phillips.

The investigation, which was begun early in 1919, had been requested by the Brotherhood of Operative Potters because they desired to disprove the contentions that their trade was extremely hazardous and that the workmen in certain occupations were likely to develop lead poisoning. These contentions were maintained by life insurance companies as grounds for discrimination in the granting of life insurance policies to certain groups of pottery workers. The investigators received cordial support from both the workers and the pottery managers.

Ninety-two potteries, situated in New Jersey, Ohio, Pennsylvania, and West Virginia, employing 21,000 persons, or 53 per cent of the total pottery workers in the United States, were investigated. Only the workers exposed to lead were examined, and of the total examined, 1,504 were males and 398 females. A very large majority of the workers employed in the pottery industry are native-born Americans.

The portal of entrance through which the larger part of the lead is received by the body was found to be the stomach, as the lead was inhaled as dust, retained in the nasal and pharyngeal cavities, and later swallowed with mucus, saliva, and food. The chewing of tobacco, eating food contaminated with lead dust, and carelessness in personal habits such as wiping the lips, mustache, etc., with glaze-covered fingers are contributory means toward the entrance of the lead into the human body.

A lesser, but still important portal of entry, is by the lungs, which absorb lead from fumes as well as dust. Absorption of lead through the skin is possible, but was found to be almost negligible in this case.

Risk of lead poisoning differs greatly in the many occupations of the pottery trade. The highest percentage of poisoning among men was found to be among the dippers and the next highest among the mixers and the odd-men. The highest percentage of poisoning among the women is among the dippers' helpers and the ware gatherers. These among both men and women, are specified occupations, brought into direct contact with the glaze.

The percentage of lead poisoning for these, as well as for other workers, drops as the percentage of lead used in the glaze decreases and lead poisoning of course may be expected to disappear when leadless glaze is used. The adoption and use of leadless glazes is not impossible, for they are used now satisfactorily by European potteries. Certain objections, however, which have prevented their

use in America, can at present be overcome only by radical changes in the manufacturing and firing methods. However, great improvement toward the decrease of lead poisoning can be brought about by the adoption of fritted lead glazes, as it would only be necessary to employ two or three men to prepare and frit the glaze against the present methods now employed, whereby large numbers come in contact with the lead glaze, either in its preparation or its use. Methods and formulas for making proper frits are given in the report.

The number of cases of poisoning found in the various occupations of the pottery trade does not alone establish their relative hazard, for this must be considered in the light of numerous modifying factors. The investigation, for instance, showed that the number of cases of lead poisoning increases with age of the workers, with their relative years of exposure, and with the length of the workday. It showed also that poisoning is more prevalent among the men than among the women, but this was shown to be due to the fact that the men had been exposed for about three times as many years as the women. It showed also that poisoning was more prevalent among workers who eat in the workroom or drink from vessels used in the workroom but not properly covered; and in plants where the toilet facilities, ventilation, and lighting are bad, and in those where the dust counts and percentage of lead in the dust are high. It is easy to see that any or all of these respective factors are likely to be influenced by the susceptibility of the individual or play a more or less important part in the production of lead poisoning as the personal habits and tendencies of the individual vary.

The relative weight to be given to these and other minor factors is very difficult to fix definitely, and the authors urge that no one should jump at the conclusion that to remedy any particular condition, other than remove the lead from the glaze, would immediately reduce the poisoning. The effect of each and all of them, however, deserves careful consideration.

The most important recommendations given to the workers who are really anxious to protect themselves follow: Always eat a good breakfast, drink milk, never eat or drink in the workroom, and never drink from uncovered containers kept in the workroom. Never wear street clothing and shoes in the workroom, never take work clothes home, and keep the work clothes and street clothes in separate sections of the locker. While at work do not chew tobacco or gum, do not spit on the floor, do not wear beards, do not stroke mustache with glaze-coated hands while at work, and do not put fingers, if covered with glaze, on lips or in mouth. Keep your hair covered in the workroom. When quitting work wash face and hands with hot water, clean finger nails, and rinse out mouth. Avoid

creating dust, insist that only wet sweeping and dusting be done, and avoid spilling glaze, as it will create lead dust.

Plant managers should supply: Bubbling fountains with palatable drinking water, adequate dressing rooms with two compartment lockers for each worker, decent and adequate toilet facilities, and adequate natural and artificial illumination and ventilation. They should discourage eating in the workroom and eating anywhere without previous washing of the hands and face, should encourage the use of overalls, should absolutely forbid dry sweeping and all sweeping of any type during work hours, and should prevent, so far as possible, the spilling of glaze and the consequent dust and dirt.

The first number of a new publication The International Journal of Gastro-Enterology, edited by G. L. Soresi, M. D., appeared July 1, 1921. It is the aim of the editor to publish original papers on problems relating to gastroenterology and allied branches of medicine and to render these papers more valuable by the commentaries of at least three men of high scientific standard in that specialty. This journal, being international in scope and aiming to promote scientific intercourse between members of the profession of all countries, will publish papers contributed in their original language, the first issue containing two such papers, an experiment in medical journalism which will be watched with interest.

An important feature of this journal is a section devoted to "Preliminary notes" and designed to protect and encourage original workers, and at the same time to prevent ideas that are not fully developed and found to be really valuable from entering into medical practice.

The first issue is beautifully illustrated and is printed on an India paper having a yellowish tint which is restful to the eyes. The United States Naval Medical Bulletin welcomes it into the great family of medical periodicals.

A recent report by Lieut. Col. Dalrymple, of the Royal Army Medical Corps, concerning the treatment of malaria-infected troops in France, published in Observations on Malaria by Medical Officers of the Army and Others, War Office, London, 1919, shows how serious, from a military standpoint, this infection may become, and how proper treatment will result in the disappearance of the infection and the consequent restoration of the soldiers to duty.

Twenty-two battalions of infantry arrived in France from service in Saloniki, and a careful examination demonstrated that between

70 and 80 per cent of the men were infected with malaria. The daily sick call averaged from 30 to 60 cases of malaria in most of the regiments and had the troops been ordered at once to active field service not over 50 per cent of the men could have complied with the order.

Owing to the extent and severity of the malarial infection in these battalions they were placed in camps and every officer and man placed upon a routine quinine treatment. The treatment adopted was as follows:

Each officer and soldier received daily doses of quinine as follows: Fifteen grains of quinine, sulphate or hydrochloride, in solution, for 14 successive days, with the troops in parade formation, so that its administration could be supervised by the officers. Afterwards for a period of two months, 60 grains of the drug were given per week, at the rate of 10 grains every day for 6 days, Sunday excepted. The quinine parade of each regiment took place at a definite time daily. If relapses occurred the men were sent at once to hospital, where the routine treatment was as follows:

Quinine in solution in 10-grain doses given every 4 hours until 40 grains were given in the 24 hours; this dose was continued for 5 days. If the soldier remained fever free for two days afterwards he was placed upon the routine treatment outlined above; if not, the more intensive treatment was repeated.

The results of the treatment of these battalions were most gratifying. The average length of treatment before the men were ready for active duty was 10 weeks, and two divisions of the troops were put in the forward area within three months of commencement of treatment practically relapse free.

The above experience demonstrates that troops badly infected with malaria can be rid of the infection if quinine is given in the proper dosage and in the proper manner, i. e., under the direct supervision of officers at stated times, and that the use of the drug is not attended by injurious effects, even when continued for a long period of time. (Medico-Military Review, Medical Department, U. S. Army.)

There has recently been reported to the Surgeon General of the Army the case of a soldier, a patient in a station hospital, who was poisoned by being given 60 c. c. of formaldehyde solution by mistake for 60 c. c. of magnesium sulphate solution. This poison was administered by an enlisted man of the Medical Department, on duty in the ward, at the direction of the nurse in charge to give the patient a dose of magnesium sulphate.

Such an unfortunate event should bring forcibly to the attention of all medical officers and nurses the great importance of complying

with all the requirements of the Manual for the Medical Department relative to the safe-keeping of poisons and the administration of medicines.

That the shaking of alkalinized aqueous solutions of arsphenamine in the air for 60 or even 30 seconds greatly increases their toxicity, probably by oxidation, is stated by G. B. Roth as a result of experiments described by him in a recent report to the U. S. Public Health Service.

Some preparations, of neoarsphenamine particularly, may not be readily soluble, and such are liable to be shaken to hasten solution. The results from this are almost always highly toxic and should not be used clinically; although a relatively low-grade preparation may tolerate 5 or 10 seconds of shaking and yet pass the hygiene laboratory tests. Shaking in a closed bottle containing no air seems not to increase the toxicity.

The author concludes that the toxicity of the solutions is greatly influenced by the manner of their preparation, and that they should not be made in an open mortar or a large beaker. (Medico-Military Review, Medical Department, United States Army.)

The new buildings of the Peking Union Medical College, erected by the China Medical Board of the Rockefeller Foundation, were dedicated in September. The college, situated in the capital of the Chinese Republic, had its beginning in an earlier institution, the Union Medical College, founded in 1906 by the joint efforts of six British and American missionary societies. The property of the earlier school was transferred in 1916 to the China Medical Board of the Rockefeller Foundation, which purchased additional land and erected, in an interesting adaptation of classic Chinese architecture, a series of hospital and laboratory buildings. The institution comprises not only the medical school, but also a 250-bed hospital with outpatient clinics, a training school for nurses, and a premedical school—an institution of junior college grade with a distinct faculty and group of laboratory and classroom buildings.

A summary report by the Commission on Milk Standards for the nine years ending December 10, 1920, recently published by the United States Public Health Service, contains matters of much interest to health officers and to chemists and bacteriologists.

Standard whole milk, says the report, should contain not less than 8.5 per cent milk solids not fat and 3.25 per cent milk fat, standard

skim milk not less than 8.75 per cent of milk solids, standard cream not less than 18 per cent milk fat, and be free from all constituents foreign to normal milk.

The commission believes that it is necessary to permit standardized and adjusted milk; this despite the fact that it recognizes the ease with which milk is contaminated and the difficulty of so controlling standardizing, skimming, homogenizing, souring, etc., as to prevent contamination and the use of inferior materials. The manipulation of the milk, however, should be controlled; the product should be labeled "adjusted milk" (the label showing the minimum guaranteed per cent of fat); and the milk should comply with the sanitary and chemical requirements of unmodified milk.

To meet conditions in cities where milk contains less than 8.5 per cent solids not fat, milk sellers should be permitted to choose whether they will sell under the regular standard or under a guaranteed statement of composition. The sale of any normal milk should be permitted if its per cent of fat is stated. If this is not stated, the sale should be held to be unlawful unless the milk contains 3.25 per cent milk fat. Dealers selling under the guarantee plan should be required to state the guaranty conspicuously on all milk containers.

BOOK NOTICES.

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SURGERY, ITS PRINCIPLES AND PRACTICE, by various authors, *Edited by W. W. Keen, M. D., LL. D., emeritus professor of the principles of surgery and of clinical surgery, Jefferson Medical College, Philadelphia.* Volumes VII and VIII. W. B. Saunders Co., Philadelphia, Pa., 1921.

These two volumes bring Keen's Surgery up to date. In them Dr. Keen, through his carefully chosen contributors, has gathered together a vast store of new knowledge of military, naval, and civil surgery.

Volume VII opens with short but illuminating chapters on inflammation; diseases caused by animals, insects, and reptiles; anthrax; surgery of the skin; and syphilis. The subject of gas gangrene is skillfully treated by Sir Cuthbert Wallace, of London, and is followed by an excellent chapter on tetanus by Dr. Fred T. Murphy, of St. Louis.

The following chapters deal with the organization and administration of the medical departments of the Army and Navy in war. These two chapters especially, and the following one on surgery in a fighting ship, should be read carefully by every naval medical officer, as they sum up our knowledge of military and naval practice.

There is a chapter on traumatic shock by Dr. W. B. Cannon, of Boston; one on the transfusion of blood and its substitutes by Dr. Burton J. Lee, of New York—an able review of the subject which deserves careful study.

Dr. John H. Gibbon, of Philadelphia, contributes a chapter on surgical technique which is based upon the experiences of the late war. Fractures, gunshot fractures, gunshot wounds, spinal injuries, peripheral nerve injuries, joint injuries, and their modern treatment are all competently handled. Discussions of orthopedic surgery, both civil and military, and of the military surgery of the vascular system, close the volume.

For the naval surgeon Volume VIII contains chapters on the surgery of the thyroid by Dr. C. H. Mayo; amputations, especially from the artificial-limb standpoint, by Dr. W. J. Taylor, of Philadelphia: operations on bones and joints by Dr. J. P. Warbasse, of New York: surgery of the head and war wounds of the face and jaws. There is an excellent chapter on dental surgery and the treatment of fractures of the jaw. Dr. Chevalier Jackson, of Philadelphia, contributes a chapter on direct laryngoscopy, bronchoscopy, and esophagoscopy, in which his special instruments are illustrated and described. One of the longest chapters in the volume is on the surgery of the thorax by Dr. G. J. Heuer, of Baltimore. Dr. G. W. Crile, of Cleveland, contributes his views on shock and anesthesia. Appendicitis and the surgery of the gall bladder, biliary ducts, and kidney are treated in chapters which are supplementary to chapters in previous volumes. There is a good chapter by Drs. R. M. Pearce and J. H. Austin on tests of renal functional efficiency in surgical conditions. The surgery of the bladder and ureters by Dr. Bransford Lewis, of St. Louis, and the surgery of the prostate by Dr. H. M. Young, of Baltimore, are exhaustively presented by the contributors. Dr. R. T. McKenzie, of Philadelphia, contributes a timely chapter on physiotherapy and mechanotherapy. Diagnostic immunologic reactions and specific therapy in surgical diseases are reviewed by Dr. J. A. Kolmer, of Philadelphia. Among the closing chapters of the volume is one by Colonel J. R. Church, Medical Corps, U. S. Army, on poison gas in war, in which the contributor skillfully reviews this subject.

The volume closes with a note by Dr. Keen himself on an effective method of dressing an artificial anus. (W. M. K. AND E. J. C.)

THE PRINCIPLES OF THERAPEUTICS, by *Oliver T. Osborne, M. A., M. D., professor of therapeutics, department of medicine, Yale University.* W. B. Saunders Co., Philadelphia, Pa., 1921.

This is an excellent work, very well written, and the subject matter is well arranged, with chapters on vaccines and serums, foods and diets, endocrine glands and organotherapy.

The author states that the work has been written with the view of presenting the data necessary for the student to well understand

the objects of scientific treatment, the rational use of active drugs, and the physical methods used in the treatment of diseases. The work is well indexed and is very thorough. (J. J. O'M.)

TREATISE ON FRACTURES IN GENERAL, INDUSTRIAL, AND MILITARY PRACTICE, by *John B. Roberts, A. M., M. D., F. A. C. S., and James A. Kelly, A. M., M. D.* Second Edition. J. P. Lippincott Co., Philadelphia, Pa., 1921.

The reader of this book, whether engaged in private, industrial, or military surgery, will find that the text has been thoroughly revised, that particular attention has been given to differential diagnosis, and that many valuable illustrations have been included.

In the preface the author gives a brief outline explaining in a comprehensive way the methods of treatment to be used in the various types of fractures, showing the reader at the outset "the essence of the teaching which it is hoped this volume will impart."

The chapter on general considerations is excellent, discussing in complete, simple, and lucid detail the signs, symptoms, and complications of fractures from all angles. As the author says and exemplifies in his book, no one method is applicable to all fractures. He gives an instructive and helpful outline of the general rules applicable in the use of all forms of dressing for fractures. The book has a splendid illustration of an actually applied Buck's extension, a dressing that is so necessary in fractures of the lower extremities, but upon which not every book lays sufficient stress. He discusses and amplifies the three systems of treating fractures, (1) prolonged immobilization, (2) mobilization method of Lucas Championniere, (3) the traction method of Bardenhuer. The anatomical illustrations are excellent in showing the relation of fractured long bones to soft structures.

The closing chapter on industrial and war fractures contains valuable information gleaned from recent experience with fractures in their severer phases during the World War. The work is comprehensive, complete, direct in its explanation and instruction, a most valuable asset to any collection of books. (E. J. C.)

OPERATIVE SURGERY, by *John J. McGrath, M. D., F. A. C. S., professor of surgery, Fordham University.* Sixth Edition. F. A. Davis Co., Philadelphia, Pa., 1921.

This book is a worthy, carefully executed, and substantial treatise on the subject of operative surgery. The discussion of hemorrhage, with the methods of transfusion outlined, receives the proper amount of attention and a due place of importance early in this work. The chapter treating of operations on the head is splendidly written, concise, and gives a complete descriptive presentation of the various methods of approach in operations on the skull. The descriptive

anatomy throughout the book, with its bearing on operative surgery, is well handled, especially the surgical anatomy of the face prior to the discussion of operations on the face. The chapters on neck surgery and the discussion of operations on the stomach and intestines are excellent. The work throughout is concise, to the point, accurate in detail, up to date, and very well written.

The value of this treatise as a book for reference and instruction, can not be too highly recommended. (E. J. C.)

URINARY ANALYSIS AND DIAGNOSIS, by *L. K. Heitzmann, M. D.* Fourth Edition. William Wood & Co., New York, 1921.

The new (fourth) edition of this book takes but little cognizance of useful methods that have been developed during the six years that have elapsed since the appearance of the third edition, and the changes in the text are but few. Although in the first part, "only those tests are given, which can be used with advantage and without the necessity of a completely equipped chemical laboratory, by the general laboratory worker and the practitioner," the colorimetric methods for nitrogenous constituents involving Nesslerization and the use of permutit could well have been included. Nessler tubes can replace the colorimeter with sufficient accuracy for clinical purposes. Folin's micro-Kjeldahl method for total nitrogen is quite simple. Benzidine is not mentioned in connection with occult blood. With the many tests for acetone bodies, it would seem that the use of the Scott-Wilson reagent (distinctive for acetone) could have been given. Mosenthal's results with his nephritic test diet deserve space in a book of this caliber. "The greatest stress has been laid upon the microscopical examination and especially the microscopical diagnosis," but I believe the general opinion would still follow the author's own words, "the majority of textbooks on this subject still teach that diagnosis can not be made from a microscopical examination of urine, except in those cases in which casts are present." The text upon microscopical examination is, however, admirable and very useful. It is unfortunate that the illustrations are not more realistic. They are, to say the least, decidedly crude, and the few new ones are not much of an improvement over those replaced. (C. W. O. B.)

GYNECOLOGY, by *Brooke M. Anspach, M. D., associate in gynecology, University of Pennsylvania, with an introduction by John G. Clark, M. D.* J. B. Lippincott Co., Philadelphia, Pa., 1921.

This is a new textbook which has been sponsored by that eminent gynecologist, Dr. John G. Clark, and Dr. Anspach is to be congratulated in producing a book worthy of its sponsor. In the preface he states that "a logical plan for studying the pathology of any organ or group of organs and the method of treatment may be formulated

to include, (1) a description of the normal structure and of the normal function; (2) a review of the causes that produce the abnormal; and (3) a summary of the manifestations of the abnormal and of the methods of treatment." Believing this to be a rational sequence, the author has arranged and discussed the subject matter in the following order: (1) Normal anatomy and physiology; (2) morbid anatomy and physiologic abnormality that are dependent upon the developmental defects; (3) the acquired causes of disease of the reproductive organs; (4) the general symptomatology, both subjective and objective, of diseases peculiar to the pelvic organs, together with the approved methods of investigation; and finally (5) a systematic arrangement and description of the diseases affecting the organs and structures of the entire generative tract—their morbid anatomy, symptomatology, diagnosis, and treatment. In this way the author approaches and treats his subject in a methodical manner that gives to the work a natural sequence and proper line of thought, making it thorough, well constructed, and more easily comprehended and assimilated.

The book is well supplied with excellent and highly instructive illustrations. The illustrations depicting the gross pathological lesions about the external genitals are sufficient to give even the beginner in the study of gynecology an accurate idea of the actual pathological lesion in vivo. Descriptive pictures of operations are distinctly clear and readily understood, an important thing for a man who wants to learn and understand the delicate repair and constructive surgery demanded in this specialty.

The chapter on backache, a distressing and oftentimes prominent symptom found in women from various disorders, is vital and important to any physician and a fitting addition to any well-rounded-out work along these lines. The chapters set aside for the discussion of postoperative treatment, postoperative complications, and radium and roentgen-ray therapy are recommendations in themselves to show how thoroughly the author has completed his work. (E. J. C.)

THE PRINCIPLES OF IMMUNOLOGY, by *Howard T. Karsner, M. D., professor of pathology, Western Reserve University, Cleveland, and Enrique E. Ecker, Ph. D., instructor in immunology, Western Reserve University, Cleveland.* J. P. Lippincott Co., Philadelphia, Pa., 1921.

This book is a concise work on the fundamental principles of immunology presented in such a clear manner as to make the volume of especial value to students of medicine and to practitioners who are unable to consult the great mass of material which has been published regarding resistance and immunity.

The authors consider, in an adequate manner, the virulence of organisms, general conditions of infection and immunity, the gen-

eral phenomena of immunity, toxins and antitoxins, agglutinins and precipitins, cytolysins, cellular resistance, complement fixation and its application to the diagnosis of disease, hypersusceptibility, and the digestive ferments. A very desirable feature of the book is the appendix, in which the authors have collected and presented in a brief way data on the practical application of the therapeutic employment of blood serum, prophylactic vaccination, and vaccine therapy.

The subjects treated are handled in an excellent and up-to-date, if somewhat brief, manner. Facts are concisely stated, theories and hypotheses are treated fairly, and conclusions are soundly drawn.

There is room for doubt as to the authors' conclusions upon the teaching value of the diagrams usually employed in explaining Ehrlich's hypothesis.

It would seem to have been wise if more of the technique of immunology had been given. No method is given, for instance, for taking blood from laboratory animals without killing them. It is hardly worth the space it takes to describe the technique of making opsonic indexes. Few people do them nowadays, and it is questionable whether this so-called index really tells us anything.

It is a pity that more time was not given in the text to a consideration of immunity reactions in vaccination (cowpox), as the diagnostic advantages of these as to immunity or lack of it in smallpox is great.

On the whole, the book is most satisfactory in covering the subject. It is well printed and will prove most helpful not only to students and busy practitioners but to the profession in general. **(J. H.)**

THE ALLEN (STARVATION) TREATMENT OF DIABETES, by *Lewis Webb Hill, M. D., junior assistant visiting physician, Children's Hospital, Boston, and Rena S. Eckman, dietitian, Massachusetts General Hospital, Boston, 1911–1916, with an introduction by Richard C. Cabot, M. D.* Fourth Edition. W. M. Leonard, Boston, Mass., 1921.

This is a little volume of 140 pages which should be in the library of every physician and in the hands of every diabetic patient. The book begins with a lucid presentation of the details of Dr. Allen's starvation treatment. This is followed by a series of illustrative case reports from the Massachusetts General Hospital and the Children's Hospital, Boston. Continuing, we note a short passage written for the diabetic patient, telling him in a few words something of his disease. As a convenience to the practitioner, the qualitative and quantitative tests for the examination of diabetic urine are included.

Most valuable of all are a graduated series of diet tables and a number of handy recipes for the preparation of diabetic foods. A chapter on food values and one on the protein and starch content of various proprietory "diabetic foods" completes the volume. (W. M. K.)

PRACTICAL PREVENTIVE MEDICINE, by *Mark F. Boyd, M. D., M. S., C. P. H., professor of bacteriology and preventive medicine, University of Texas; passed assistant surgeon (reserve), U. S. Public Health Service.* W. B. Saunders Co., Philadelphia, 1920.

This little volume of 352 pages represents, as its author states in the foreword, an endeavor to briefly present the salient features of modern preventive medicine. In a desire to cover the entire field a great condensation has been effected which, in many instances perhaps, results in an inadequate consideration of important subjects. It is believed the text contains the minimum amount of up-to-date knowledge of the subject, expressed in a pleasing manner and which a practitioner of medicine should be expected to possess.

The book is composed of seven sections, of which the first deals with diseases due to invading microorganisms and considers sources of infection, the dissemination of infective agents, contact transmission, diseases transmitted by contact, general measures of disease control, disinfectants and disinfection, excreta disposal, the relationship of water to health and disease, water purification, production and inspection of milk, milk as a route of infection, other foodstuffs as routes of infection, insects as vectors of infective agents, diseases transmissible by insects, lower animals as sources of infection for man, and other aspects of infectious disease. In section 2, the author considers deficiency diseases; in section 3, occupational hazards and diseases; in section 4, diseases arising from the puerperal state; in section 5, diseases transmitted from parent to offspring; in section 6, special aspects of hygiene and sanitation; and in section 7, demography. It contains numerous references to the public-health literature, especially that which exists in the publications of various departments of the United States Government, which are readily obtainable by the student of this subject, and the volume is amply and well illustrated.

It is regrettable that no mention of the use of calomel ointment in the medical prophylaxis of venereal disease is made in the text.

On the whole the work is a distinct addition to the literature of preventive medicine and is recommended as a manual for all interested in this important and growing branch of the medical science. (W. M. K.)

DIAGNOSTIC AND THERAPEUTIC TECHNIC, by *Albert S. Morrow, A. B., M. D., F. A. C. S., attending surgeon to the City Hospital and to St. Bartholomew's Hospital, New York.* Third edition. W. B. Saunders Co., Philadelphia, Pa., 1921.

In this volume, the author, who is the son of the late Dr. Prince A. Morrow, has brought together and arranged in a manner easily accessible for reference, a large number of procedures employed in the diagnosis and treatment of surgical diseases. The majority of the methods detailed in the book are the practical procedures which the general practitioner or the hospital interne may be called upon to perform at any time; yet much space has been devoted to methods of diagnosis and technique which are essentially in the domain of the specialist. Each procedure has been given in great detail. The work is up to date and conforms with the latest advances in methods of diagnosis and treatment. It is profusely illustrated, a special feature being a sketch of the collection of instruments required in the technique of each procedure.

The first portion of the book is devoted to a description of certain general diagnostic and therapeutic methods such as the administration of anesthetics, both general and local, sphygmomanometry, transfusion and the injection of human blood serum, venesection and its allied procedure, the administration of arsphenamine and neoarsphenamine, the treatment of neuralgia by injections, the disinfection of wounds by the Carrel-Dakin technique, Bier's hyperemia treatment, the production of an artificial pneumothorax, the diagnosis and treatment of fistulous tracts by means of bismuth paste, the collection and preservation of pathological material and exploratory punctures. The latter portion of the book deals with the methods of diagnostic and therapeutic technique which pertain to special regions and organs, such as the nose and accessory sinuses, the ear, the larynx and trachea, the esophagus, the stomach, the colon and rectum, the urethra and prostate, the bladder, the kidneys and ureters, and the female generative organs. Readers of this book will note that operative methods have been omitted as far as possible, only those being considered which are required in emergencies or which form a necessary part of some of the measures described.

So far as the reviewer is aware, there is no single volume which contains so much useful information concerning diagnostic and therapeutic technique. The book is so valuable to medical officers that its addition to the supply table of the Medical Department of the Navy for use on ships has been recommended. (W. M. K.)

ESSENTIALS OF TROPICAL MEDICINE, by *W. E. Masters, M. D. Brux., M. R. C. S., L. R. C. P. Lond.* William Wood & Co., New York, 1920.

The author states in his preface that this work contains nothing new, and it is not intended as a substitute for any other work on

tropical medicine. It is claimed to be a digest of our knowledge of tropical medicine in a handy form for ready reference, the vade mecum of the student and busy tropical practitioner. If it had proved to be what its author claimed, it would have been welcome indeed. However, a careful perusal of this work reveals many gross errors and misstatements. The author has attempted to treat each subject fully in the systematic manner taught by the London School of Tropical Medicine, of which he is a graduate, and in so doing he has produced a volume which gives the impression of being a huge laboratory note book, full of the mistakes a student in class might make. The book shows hasty preparation and a lack of knowledge of the modern literature of many of the subjects treated. Apparently the author did not have access to the reports of investigations on gangosa by medical officers of the United States Navy, as his statements concerning the treatment of this disease are erroneous and misleading. (W. M. K.)

PRACTICE OF MEDICINE, by *Hughes Dayton, M. D.* Fourth Edition. Lea and Febiger, Philadelphia, Pa., 1921.

A handy, well-written, up-to-date epitome of practice for hasty reference by physicians or students of medicine. (W. M. K.)

TRAUMATIC SURGERY, by *John J. Moorhead, B. S., M. D., F. A. C. S., professor of surgery and director department of traumatic surgery, New York Post-Graduate Medical School and Hospital.* Second Edition. W. B. Saunders Co., Philadelphia. 1921.

The first edition of this book antedated the entry of the United States into the World War by a few weeks and was deficient in that it did not treat fully the newer methods of practice then being developed in Europe.

The second edition was prepared by Dr. Moorhead soon after he had returned from a very active service in France, and although he is not of the opinion that the management of the injured has been radically changed by war experience, he is convinced that the measures of military surgery applicable to civil life have been tried out sufficiently to justify the inclusion of some of them in this volume. We find in the new edition a complete discussion of the modern methods of treatment applicable to accident cases.

A large portion of the volume is devoted to a consideration of fractures, dislocations, and injuries of the joints. The volume is admirably illustrated, especially the section on special fractures in which the illustrations show clearly the special apparatus required for fixation, suspension, or traction. The book is recommended to all who are concerned in any way with accident surgery. (W. M. K.)

CANCER AND ITS NON-SURGICAL TREATMENT, by *L. Duncan Bulkley, A. M., M. D., senior physician to the New York Skin and Cancer Hospital.* Wm. Wood & Co., New York, N. Y., 1921.

This is a study of the cancer problem from every angle excepting that of operative surgery, with statistics and discussion of the failures of modern methods of treatment—operative, radium, and X-ray—compared with the improved results obtained by medical treatment. The author states that the mortality of cancer has risen 30 per cent during the past 20 years under surgical domination, and gives a review of cases treated medically from which the reader may be his own judge as to results.

The failures of surgery, radium, and X-ray are fully discussed. The author takes issue with our present-day views of the treatment of this condition and recommends a vegetable diet with hygienic adjustment of the functions of the body, and the proper use of such remedies as will incite the various organs of the body, including the endocrinous glands, "to form and eliminate properly the effete elements circulating in the system and effect the production of a healthy and proper blood stream." A diet list is given which consists of foods embraced in the 5, 10, and 20 per cent vegetables, with breads and other carbohydrates, all with a very low protein content.

The work is very lengthy, verbose, and hardly conclusive. (J. J. O'M.)

EPIDEMIC RESPIRATORY DISEASE, by *Eugene L. Opie, M. D., Colonel, M. R. C., U. S. Army; professor of pathology, Washington University School of Medicine. Francis G. Blake, M. D., Major, M. R. C., U. S. Army; associate member of the Rockefeller Institute for Medical Research. James C. Small, M. D., formerly First Lieutenant, M. C., U. S. Army; bacteriologist, Philadelphia General Hospital. Thomas M. Rivers, M. D., formerly First Lieutenant, M. C., U. S. Army; associate in bacteriology, Johns Hopkins University.* C. V. Mosby Co., St. Louis, 1921.

This very complete volume is an extensive study of influenza and pneumonia as seen in Camps Funston and Pike during the epidemic of 1918–19, the above authors having been appointed as a commission by the Surgeon General of the Army to study the pneumonias present in the above camps at that time. The medical magazines have presented volumes of literature during the past three years on the subject of influenza and its complications, and much of it had been very poorly studied and presented. The authors have made a very complete study of the conditions and present very positive conclusions from the bacteriological and pathological viewpoints. They state that "from all the evidence available it seems highly probable that B. influenza is the specific etiologic agent of epidemic influenza because it is always present in early uncomplicated cases of influenza; it is predominantly so during the acute stage of the disease in cases

going on to rapid recovery without development of complications; its rapidly increasing presence in normal individuals simultaneously with the progress of the epidemic indicates that actual dissemination of B. influenza readily occurs, and is very widespread during pandemic times; cultures of B. influenza are pathogenic for animals, and may produce in monkeys a disease closely resembling influenza."

The chapter on " Pathology and bacteriology," following influenza, is very well prepared and well illustrated with photographic plates of the different pathologic features of the disease. There is also a chapter on the pathology and bacteriology of the various types of pneumonia following measles. This is prepared on only 18 cases that came to autopsy, but is very complete.

The work goes a long way toward clearing up the confusion that has existed since the influenza pandemic, on the clinical diagnosis, with bacteriology and pathology of the pneumonias that followed, and is well worth careful reading. (J. J. O'M.)

HEART AFFECTIONS, THEIR RECOGNITION AND TREATMENT, by *S. Calvin Smith, M. S., M. D., instructor in medicine, University of Pennsylvania Graduate School of Medicine.* F. A. Davis Co., Philadelphia, Pa., 1920.

This is an excellent volume, very well arranged and sufficiently concise to give the reader all the necessary information for a good basic knowledge of affections of the heart. The author states that he "strives to encompass in small volume sufficient fundamentals of anatomy, physiology, pathology, diagnosis, and treatment to give the busy physician a working knowledge of the more recent advances in studies of the heart." This is an excellent aim in any author, and he has succeeded in presenting a book that is very readable and has all the meat of the subject.

The chapters on " Examination of the patient " are very complete and embrace the many points that lead to a correct diagnosis from inspection of the patient, palpation, percussion, auscultation, and interpretation of the presenting symptoms. The knowledge that graphic methods of examination, such as polygraph and electrocardiograph, give is discussed in a very lucid style, and the reader will find all that is necessary for a proper understanding of the tracings made from the different pathologic conditions of the heart.

The book is well illustrated, many illustrations being made from photographs of actual conditions existing in the heart and its valves, and adds to the attractiveness of the work. (J. J. O'M.)

MOUTH HYGIENE, by *Alfred C. Fones, D. D. S.* Second edition. Lea & Febiger, Philadelphia, 1921.

This is an admirable textbook for dental hygienists whose work is limited to the scaling and polishing of the teeth. Prevention being

the keynote of modern dentistry, the dental hygienist has been developed to fill a well-recognized need in the dental profession, and he is especially of value in preventing the development of pyorrhea and dental caries by a scientific method of scaling and polishing all the surfaces of the teeth. The list of contributors alone is sufficient to merit attention, as men well known to all in the profession have written chapters dealing with the normal and abnormal conditions found about the teeth.

The chapter on dental prophylaxis is of especial interest in giving the latest ideas on the system of instrumentation and is illustrated to show the four distinct motions, termed the digital, the wrist, the rotary or forearm, and the rigid arm motion. These are shown on models with the proper fulcrum indicated in each instance. (H. E. H.)

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